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### Improved Machine for Drilling Stone.

The object of the machine represented in the engraving is to facilitate the drilling and quarrying of stone, the splitting of blocks, and the blasting of rocks. It is, in fact, the ordinary stone drill, improved and extended in arrangement and management. A light frame holds a series of drills of any number required, the drills being so arranged and connected that they may be instantly removed from the frame for transportation from place to place. The drills are all raised by one complete revolution of the lifting shaft, A, but only one at a time, so that the power, whether manual, horse, steam, or water, has the weight of but one to lift at once. The drills are turned as well as raised by the curved arms, B, which, impinging on the convex under side of the disks, C, give the drills a partial rotary motion as they are lifted, similar to that by the hand in the single ordinary stone drill. The drills can be set at any required distance, one from the other, by means of adjustable eyes, set in the parallel or slotted bars at the top and near the bottom of the frame. As the drills work down into stone, the shaft, A, is lowered by the cog wheels, D, on a shaft passing across the frame, working in the sliding racks, E, to which the lifting shaft boxes are attached, and is held in position by the catch lever, F, and curved rack, G.

The holes are moistened by the water cans, H, which have their spouts adjusted so that the water strikes the sides of the drills and runs down into the holes. The curved lifting arms are adjusted by set screws working in longitudinal grooves in the shaft on which they are fixed, and the water cans are secured at any distance apart by bolts passing through a slot in the cross bar on which they stand. The screws, I, through the feet of the frame are for leveling the frame when standing on rough or uneven surfaces.

The machine is portable, durable, and cheap. The inventor says that each drill will bore an inch a minute in very hard stone, working by man power at ordinary speed, and make a much smoother hole than can be made by hand. It is the subject of patents by A. M. Southard and W. J. Hobson, dated Sept. 3, 1867, and April 28, 1868.

All orders for machines and letters for further information should be addressed to Southard & Hobson, care of the Holske Machine Co., No. 528 Water street, New York city.

SOUTHARD & HOBSON'S STONE DRILLING MACHINE.

### New Manganese Battery.

A battery, composed essentially of peroxide of manganese and a single liquid, chloride of ammonium, has been recently constructed by M. Leclanchè, and, according to *Les Mondes*, has been already somewhat extensively adopted, or, at least, taken on trial by several telegraph companies on the Continent. It has been long known that peroxide of manganese possesses an electric conductivity similar to that of metals. The author only uses the natural crystalline peroxide of the purest quality. This is broken up and placed in a porous vessel, where it surrounds a carbon plate, forming the positive pole of the battery, the negative plate outside the porous vessel is simply a thick rod of zinc; the liquid which bathes both plates is a concentrated solution of sal-ammoniac. It appears to be a very constant form of battery, and exceedingly economical.

### The Utilization of Town Sewage.

The sewage question is one which has lately attracted considerable attention in Paris; the problem, of course, has been to remove the polluted waters from the town in the most advantageous manner. The volume of these waters is now 100,000 cubic meters a day, soon it will be double this amount, and in a few years probably 500,000 to 600,000 cubic meters. We have three solutions of the difficulty. The first and most obvious is to carry the sewage into the Seine; this scheme has been well tested already, and the disadvantages seem generally more striking than the advantages. The advocates of a second plan would employ the sewage, which they would first raise by machinery to a considerable hight, in the irrigation of the fields. The fertilization of the sands at the mouth of the Thames by this means is cited in favor of the plan. The third scheme recommends itself as being the most scientific, and it is, perhaps, the best; experiments have been made with this scheme since the commencement of the spring. The sewage waters, collected in large basins, are mixed with a certain amount of sulphate of alumina—about one per cent to the cubic meter. Organic matters contained are rapidly precipitated, each cubic meter yielding about three kilgrms. of solid manure. The decanted fluid, termed clear water, can be employed in the irrigation of soils, upon which it has a very fertilizing action; it contains, in fact, small quantities of mineral matters in suspension, a little nitrogenous and organic matter, and the whole of the alkaline salts. The deposit obtained in the clarification is abundant and compact; it contains the whole of the phosphoric acid and nine tenths of the nitrogenous and organic matter, and the mineral matters dissolved or in suspension; it constitutes an excellent manure, very fertilizing, and easily transportable. Towns would thus be considered as manure factories, and it is believed that the value of the manure may be made to defray the expense of supplying the town with pure water.

### THE REYNOLDS AIR-TIGHT HEATER.

These engravings represent the mode of construction and some of the important features of a very popular heating apparatus that has, in Philadelphia and other portions of Pennsylvania, made a radical change in heaters for warming and ventilating dwellings, etc. We have been informed that its sales are large and very rapidly increasing on account of its perfection, durability, simplicity, and economy. It is from well-established evidence the original air-tight heater, and from which the others have been taken.

Fig. 1 represents the heater as set up in brickwork with the top covering and a portion of the front wall removed. The pyramidal radiator is made of heavy plate iron, well riveted together, the same as a steam boiler, and bolted upon heavy wrought-iron side plates running down into the brick-work, preventing any possibility of the escape of gas or dust into the hot-air chamber. By the insertion of tubes in the hollow brick walls for the admission of cold air, and the keeping of the fire pot below and away from the sides of the radiator, it never becomes red hot, thereby diffusing a summer-like heated air through the apartments. Its most important feature are the air-tight draft door, the dust door or screen, the novel grate bar rests, and its perfect management without dampers of any kind. The draft door, it will be perceived, is circular in form, and is provided with a planed close-fitting brass slide, for regulating the heater. The edges of both the door and frame are beveled, turned, and ground, making a water-tight joint and preventing the risk of breaking the frame by expansion. The door of itself is a most important and valuable improvement. The dust screen for carrying off the ashes and dust made by raking, is simply a box-shaped door opened at the bottom, and placed on the left hand side of the feed door. It is long enough to entirely cover the upper and part of the lower doors. When the fire needs raking, the upper and lower doors are opened and this screen shut over their openings, making a flue from beneath the grate bars, up over the fire through the upper door, for the escape of the dust which is drawn into it by the draft of the chimney or smoke flue. The grate bar rests are the latest improvement, and a very important one. In all heaters, when separate bars are used to form the grate, the rests or bearing bars upon which they are placed are put within the fire pot as shown in Fig 2, causing the coals to lie on the ends of the bars unconsumed, and obstructing the thorough raking and cleaning necessary; but by this improvement the rests or bearing bars are put under the front and back lining or tile forming the fire pot, the grate bars are then inserted in a recess in the bearing bars as shown in Fig. 3. By this arrangement, the bars can be as readily removed and replaced as by the old method, while there is no obstruction to the draft reaching every portion of the fire pot, insuring as complete combustion of its contents as is possible, at the same time allowing of its thorough cleaning without difficulty. It would occupy much space to give all the advantages to be found in this celebrated heater, but any further information needed and pamphlets giving full descriptions may be obtained by addressing the patentees and sole manufacturers, J. Reynolds & Son, cor. 13th and Filbert streets, Philadelphia, Pa.

Fig. 1.

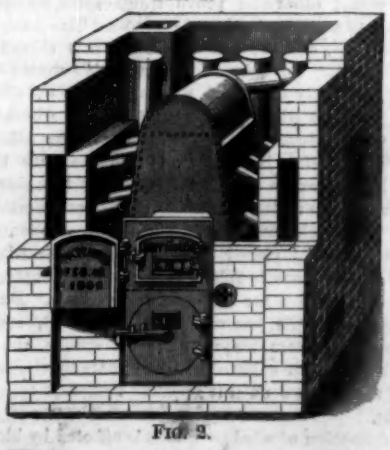


Fig. 2.

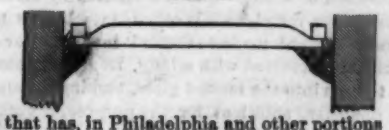
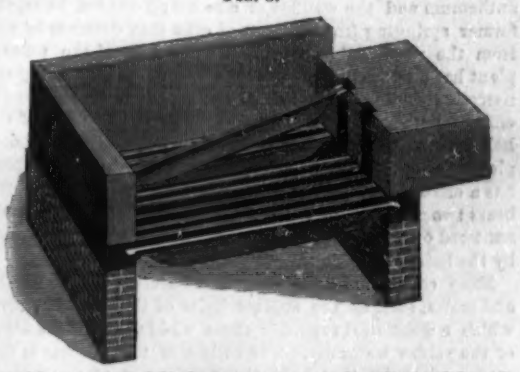


Fig. 3.



### The Phenomena of Light.

A number of experiments, as illustrating the phenomena of light, were performed the other night in the Philadelphia Academy of Music, by Professor Henry Morton of that city. The following, among others, were specially interesting:

"The professor placed himself and apparatus on a platform secured to one of the stage traps, and then was raised to a great hight above the floor, at which elevation he burned in the compound blowpipe a piece of thick steel wire rope.

The fountain of scintillating sparks and drops of melted steel —which, descending in a broad sheet some fifteen feet in hight, poured upon the stage and rolled in a torrent of fiery hail toward the foot lights—was a sight never to be forgotten. A wheel five feet in diameter, supporting electrical tubes, was rotated, while flashes of electric fire from the largest induction coil in the world, belonging to the University of Pennsylvania, were passed through, producing a dazzling star of constantly changing colored rays.

"The drop curtain, descending for a few moments, rose again, displaying a beautiful palace scene, illuminated by numerous lime lights, judiciously placed. There then marched in a great number of masked figures, in costumes representing the colors of the rainbow, and bearing banners with brilliant devices. These taking positions, formed a tableau equal in brilliancy and beauty of general effect to anything we have ever seen upon the stage. At a signal the white light was extinguished and its place supplied by pure yellow light, equally bright, when every trace of color disappeared, and the entire phalanx became a ghastly company of spectres bearing banners of white and black. The means for producing this yellow light is a device of Professor Morton's, entirely new and eminently efficient—in fact, the entire house was illuminated with it from the stage, so that the same wonderful change was manifest in the faces and costumes of the audience."

### Vegetable Hairs.

Among the many objects of interest which the vegetable kingdom offers to the microscopist, one of the most varied and the most universally distributed is to be found in what are called hairs, which clothe the surface of the leaves and flowers of a vast number of plants and trees. These hairs are appendages of, and arising from, the skin or epidermis; and although their simplest form is that of a single projecting and elongated cell, they are more generally composed of a series of cells, often bearing at the extremity a glandular protuberance containing the essential oil of the plant; and the variety of shapes which they assume appears to be almost unlimited, while the characteristics of many of them are so definitely marked, that, in the vast majority of cases, it would be quite possible to determine, if not the actual species, at least the order or family to which any specimen belonged, from the observation of a single hair. The hair of the hop-plant, for instance, is so unlike most other vegetable hairs, that it would be impossible to mistake it.

The leaves and flowers of some plants possess two or three varieties of hairs, often in close proximity to each other. The flower of the snapdragon has single celled hairs, some terminating in a globular gland, others in a cone-shaped gland. The garden verbena has some hairs like a flattened rosette on the top of a tall stalk, and others breaking out on all sides of their entire length in curiously knotted excrescences. The hair of the marigold consists of a double layer of elongated cells, built up one upon another, and lying closely side by side. The base of the hair of the common stinging-nettle contains an irritating secretion, which flows through the straight tubular elongation until it reaches the little bulb-like swelling at the extremity of the hair. This is easily broken off when touched by any object, and the acrid fluid then escapes, and produces the well known sting.

Some hairs are forked or branched, like those of the dandelion and the plane tree; others consist of a single elongated cell, like that of the cabbage. In the hair of the marvel of Peru the elongation is formed by a chain of cells placed end to end, and connected by slender threads. In the thistle and the ground sel, the last cell of the hair is lengthened out to a bristle-like extremity. On the leaves of some geraniums may be found two kinds of hairs, the one formed of a series of three elongated cells, the other a flattened disk-like form terminating a short stem of three or four cells. The branched hairs of the lavender are also intermingled with others terminating in a glandular appendage which contains the essential oil that gives to this plant its peculiar odor. On the petal of the heartsease may be found three varieties of hairs. The hairs or spires of some of the cactus tribe are like a series of spear heads placed one upon another. The southernwood hair is composed of a chain of cells, of which the three lower form the stem of the hair while the two upper are lengthened into lateral branches. The leaves of chrysanthemum and the wallflower also bear T-shaped hairs, the former springing from a series of cells that decrease in size from the root to the extremity. The hair of the tobacco plant has a two-celled gland at the extremity, containing the narcotic secretion. The hair of the lobelia is like a knotted club; others assume a star-like appearance, like those of the hollyhock and the ivy. In the geum we have another example of a club-shaped two-celled hair; while that of the bean has a crook-shaped appearance. The flower of the dead-nettle bears two-celled hairs, remarkable for the number of knobs scattered over the surface; a similar appearance is presented by the hairs of the wallflower and chrysanthemum.

Many connecting links present themselves between hairs and scales, such as the stellate hairs of the *Deutzia scabra*, which a good deal resemble those within the air-chambers of the yellow water lily. The cuticle of the iceplant is covered with hairs that have the appearance of frozen dew-drops, and consist of very large oval-shaped cells, which lie detached from one another upon the surface of the cuticle.

As we have probably said enough to draw the attention of young microscopists to this interesting branch of research, we need only add that vegetable hairs are easily preserved in weak spirit, while some retain their natural appearance very fairly in Canada Balsam.—*Hardwicke's Science Gossip.*

As an experiment, several streets in the city of Edinburgh are being illuminated at night by means of the lime light.

## Science Familiarly Illustrated.

### Glass—Its Material and Manufacture.

A great number of earths, and other mineral bodies, after being fused, do not resume their original character, upon cooling, but pass into a dense, hard, shining, and brittle state, having the character of glass; and are thus said to be vitrified. Most of these substances do not immediately become hard, upon the reduction of their temperature, but go through an intermediate, or ductile, state, in which a combintion of of softness with tenacity, enables them to be wrought into articles of use and ornament. Of these, common glass is the most important, while enamels, artificial gems, etc., belong to the same species of manufacture.

Glass is a compound substance, artificially produced, by the combination of silicious earth with alkalies, and, in some cases, with other metallic oxides. These substances, being melted together at a high temperature, unite, lose their opacity, and are fused into a homogeneous mass, which, on cooling, has the properties of hardness, transparency, and brittleness.

The most important ingredient, and, in fact, the basis, of transparent glass, is silica, or oxide of silicium. This earth, nearly in a state of purity, is found in the sand of certain situations, and also in common flint, and quartz pebbles. Sand has the advantage of being already in a state of minute division, not requiring to be pulverized. Pure silicious sand, proper for the glass furnace, is found in many localities. A great portion of that used in the United States is taken from the banks of the Delaware. When flints, or quartz, are employed, they must be first reduced to powder, which is done by heating them red hot, and plunging them in cold water. This causes them to whiten and fall to pieces; after which, they are ground and sifted, before they are ready for the furnace.

An alkaline substance, either potash or soda, is the second ingredient in glass. For the finer kinds of glass, pure pearl-ash is used, or soda, procured by decomposing sea salt; but, for the inferior sorts, impure alkalies, and even wood ashes, are made to answer the purpose. Lime is often employed, in small quantities; also borax, a salt which facilitates the fusion of the silica.

Instead of the common alkalies, the sulphate of soda may be employed in glass making. But, in this case, it is necessary to liberate the alkali by decomposing the sulphuric acid of the salt. This may be done by charcoal, or, in flint glass, by metallic lead. Lime is also used with this salt.

Of the metallic oxides, which are added in different cases, the deutoxide of lead (red lead) is the most common. This substance renders flint glass more fusible, heavy, and tough, and more easy to be ground and cut. At the same time, it imparts to it a greater brilliancy, and refractive power. Black oxide of manganese, in small quantities, has the effect of cleansing the glass, or of rendering it more colorless and transparent. This effect it seems to produce by imparting oxygen to the carbonaceous impurities, thus forming with them carbonic acid, which subsequently escapes. Common niter produces a similar effect. If too much manganese be added, it communicates a purple tinge to the glass, which, however, may be destroyed by a little charcoal or wood. Arsenious acid (white arsenic) in small quantities, promotes the clearness of glass; but, if too much be used, it communicates a milky whiteness. Its use, in drinking vessels, is not free from danger, when the glass contains so much alkali as to render any part of it soluble in acids.

Glass is of various kinds, which are named, not only from the character of their ingredients, but from the mode in which they are wrought. The name of crown glass is given to the best kind of window glass, that which is hardest, and most free from color. It is made almost entirely of sand and alkali, and a little lime, without lead, or any other metallic oxide, except a minute quantity of manganese, and sometimes of cobalt, which are added to counteract the effect of any impurities, in giving color to the glass. Crown glass requires a greater heat to melt its ingredients, than those kinds which contain a larger quantity of metallic oxide, especially of lead.

After the materials have been intimately mixed, they are subjected to the operation called fritting. This consists in exposing them to a dull, red heat, which is not sufficient to produce their fusion. The use of this process is to drive off the carbonic acid, and other gaseous and volatile matters, which would otherwise prove troublesome, by causing the materials to swell up in the glass pots. The heat is gradually increased, and the materials constantly stirred for some hours until they unite into a soft, adhesive mass; the alkali having gradually combined with the silicious earth. The reason why the fritting is conducted at a low heat is that, if a high temperature were applied at once, the alkali would be driven off, before it had time to combine with the silica.

The homogeneous mass, or frit, is next transferred to the glass pots of the melting furnace. These are crucibles, made of the most refractory clays and sand. A quantity of old glass is commonly placed upon the top of the frit, and the heat of the furnace is raised to its greatest hight, at which state it is continued for thirty or forty hours. During this time the materials become perfectly united, and form a transparent, uniform mass, free from specks and bubbles. The whole is then suffered to cool a little by slackening the heat of the furnace until it acquires sufficient tenacity to be wrought.

The formation of window glasses is effected by blowing the melted matter, or metal, as it is called, into hollow spheres, which are afterward made to expand into circular sheets. The workman is provided with a long, iron tube, one end of which he thrusts into the melted glass, turning it round until a certain quantity, sufficient for the purpose, is gathered or adheres to the extremity. The tube is then withdrawn from the furnace, the lump of glass which adheres is rolled upon a smooth iron table, and the workman blows strongly with his mouth through the tube. The glass, in consequence of its ductility, is gradually inflated like a bladder, and is prevented from falling off by a rotary motion constantly communicated to the tube. The inflation is assisted by the heat, which causes the air and moisture of the breath to expand with great power. Whenever the glass becomes so stiff, from cooling, as to render the inflation difficult, it is again held over the fire to soften it, and the blowing is repeated, until the globe is expanded to the requisite thinness. It is then received by another workman upon an iron rod, while the blowing iron is detached. It is now opened at its extremity, and, by means of the centrifugal force, acquired from its rapid whirling, it spreads into a smooth, uniform sheet of equal thickness throughout, excepting a prominence at the center where the iron rod was attached.

After the glass has received the shape which it is to retain, it is transferred to a hot chamber, or annealing furnace, in which its temperature is gradually reduced, until it becomes cold. This process is indispensable to the durability of glass; for, if it is cooled too suddenly, it becomes extremely brittle, and flies to pieces upon the slightest touch of any hard substance. This effect is shown in the substances called Rupert's drops, which are made by suddenly cooling drops of green glass by letting them fall into cold water These drops fly to pieces with an explosion whenever their smaller extremity is broken off. The Bologna phials, and some other vessels of unannealed glass, break into a thousand pieces if a flint, or other hard and angular substance is dropped into them. This phenomenon seems to depend upon some permanent and strong inequality of pressure; for when these drops are heated so red as so be soft, and left to cool gradually, the property of bursting is lost, and the specific gravity of the drop is increased.

Broad glass is a coarser kind of window glass, and is made from sand, with kelp and soap boilers' waste. It is blown into hollow cones, about a foot in diameter, and these, while hot, are touched on one side with a cold iron, dipped in water. This produces a crack, which runs through the length of the cone, nearly in a right line. The glass then expands into a sheet, in its form resembling somewhat the shape of a fan. This appears to have been one of the oldest methods of manufacturing glass.

Flint glass, so called from its having been originally made of pulverized flints, differs from window glass in containing a large quantity of the red oxide of lead. The proportions of its materials differ; but, in round numbers, it consists of about three parts of fine sand, two of red lead, and one of pearlash, with small quantities of niter, arsenic, and manganese. It fuses at a lower temperature than crown glass, has a beautiful transparency, a great refractive power, and a comparative softness which enables it to be cut and polished with ease. On this account it is much used for glass vessels of every description, as especially those which are intended to be ornamented by cutting. It is also employed for lenses and other optical glasses. Flint glass is worked by blowing, molding, pressing, and grinding. Articles of complex form, such as lamps and wine glasses, are formed in pieces, which are afterward joined by simple contact, while the glass is hot. It appears that the red lead used in the manufacture of flint glass gives up a part of its oxygen and passes to the state of a protoxide.

Common green glass, of which bottles are made, is the cheapest kind, and formed of the most ordinary materials. It is composed of sand, with lime, and sometimes clay, and alkaline ashes of any kind, such as kelp, barilla, or even wood ashes. The green color is owing to the impurities in the ashes, but chiefly to oxide of iron. This glass is hard, strong, and well vitrified. It is less subject to corrosion by strong acids than flint glass, and is superior to any cheap material for the purposes to which it is ordinarily applied.

The plates of crown glass which are obtained in the common manner, by blowing them in circular plates, afford the common material for window glass, being cut into squares by first marking the surface deeply with a diamond and then breaking the glass in the same directions, the crack always following the exact course of the incision made by the diamond. But there is always a loss or waste in cutting squares from a circular plate, besides which they can never be very large, owing to the protuberance, or *bull's eye*, which fills the center of the plate, so that a square can never be larger than can be described within less than half the circle. To remedy this disadvantage, plates for looking glasses, and others of large size, are executed in a different way, either by blowing them in cylinders or by casting them in plates at first.

Cylinder glass is blown at first in spheres, like window glass. These are elongated into spheroids by a swinging motion which the workman gives to his rod. The ends of this spheroid are successively perforated, thus converting it into an irregular cylinder. One side of this cylinder is cut through with shears, and the glass is laid upon a flat surface, where it expands into a uniform plate, without any protuberance. It is then annealed, by diminishing the heat, in the common way. When the plates are intended for looking glasses, the finest materials are used, and the heat kept at its greatest hight for a long time, to dissipate all impurities and remove any specks or bubbles.

Looking-glass plates may be blown in cylinders, when they do not exceed about four feet in length. But they cannot well be blown of a larger size than this, from such a quantity of glass as the rod will take up, without becoming too thin to bear polishing. Plates, however, may be made of more than double this size by another process, which is called *casting*, the only mode by which very large plates are produced,

When glass is to be cast it is melted in great quantities, in large pots or reservoirs, until it is in a state of perfect fusion, in which state it is kept for a long time. It is then drawn out by means of iron cisterns of considerable size, which are lowered into the furnace, filled, and raised out by machinery. The glass is poured out from these cisterns upon tables of polished copper, of a large size, having a rim elevated as high as the intended thickness of the plate. In order to spread it perfectly, and to make the two surfaces parallel, a heavy roller of polished copper, weighing five hundred pounds or more, is rolled over the plate, resting upon the rim at the edges. The glass, which is beginning to grow stiff, is pressed down and spread equally, the excess being driven before the roller till it falls off at the extremity of the table. The plate is then ready to be annealed.

As the plates which are cast for looking-glasses are always uneven and dull at their surface, it is necessary to grind and polish them before they are fit for use. The process employed for producing a perfectly even and smooth surface is very similar to that employed in polishing marble, except that the glass, being the harder substance, requires more labor and nicety in the operation. The plate to be polished is first cemented to a table of wood or stone, with plaster of Paris. A quantity of wet sand or emery is spread upon it, and another glass plate, similarly cemented to another wooden surface, is brought in contact with it. The two plates are then rubbed together until the surfaces have become mutually smooth and plane. The emery which is first used is succeeded by emery of a finer grain, and the last polish is given by colcothar or putty. When one surface has become perfectly polished the cement is removed, the plate turned, and the opposite side polished in the same manner.

As the grinding of glass causes an expenditure of a considerable portion of its substance, a great waste of glass takes place when foreign materials are employed in the manner which has been described. To prevent this loss a more economical mode has been introduced, in which the glass is ground with pure flint, reduced to powder. The mixture of glass and flint which is left after the operation is valuable for forming fresh glass.

A variety of ornamental forms are produced upon the surface of glass vessels by impressions given to them with a metallic mold while the glass is in a hot state. Flint glass is the kind which is used for articles intended to possess much brilliancy, but coarser kinds, even of colored glass, are also subjected to the same process. The simplest manner in which the operation is conducted consists in blowing the glass into the mold till it receives the impression on its outside. For this purpose a quantity of glass sufficient to form the intended vessel is taken up on the end of a pipe and inserted at the top of the mold. The workman then blows with his mouth till a hollow portion of glass is driven into the mold, and expands so as to fill every part, and receive an impression on its outside. The mold is usually made of copper, with the figure cut on its inside, and opens with hinges, to permit the glass to be inserted and taken out. As the mold is of necessity much colder than the glass, the latter substance is chilled at its surface as soon as it comes in contact with the copper; hence its ductility is impaired, and the impression given is never so sharp as that which is obtained with substances which are nearly at the same temperatures. Molded bottles, vials, decanters, etc., are made in this way.

An improvement has been made in the process of molding glass, by subjecting the material to pressure, on the inside and outside at the same time, by different parts of a mold, which are brought suddenly together by mechanical power. This process has been carried to great perfection in several of the manufactories in this country, and produces specimens which compare with cut glass in the accuracy and beauty of the workmanship. It is applied only to solid articles, and to vessels which are not contracted at top. The hot glass being dropped into the mold, a part, called the follower, answering to the inside or top of the vessel, or other article, is immediately pressed down upon it, by a lever, and the glass is thus stamped with a very distinct impression of the figure on both sides at once. The glass vessel is sometimes transferred from the mold to another receptacle, called the receiver, in order to preserve its shape, till it is cool enough to stand.

The name of cut-glass is given, in commerce, to glass which is ground and polished, in figures, with smooth surfaces, appearing as if cut by incisions of a sharp instrument. This operation is chiefly confined to flint-glass, which, being more tough, soft, and brilliant, than the other kinds, is more easily wrought, and produces specimens of greater luster. An establishment for cutting glass, contains a great number of small wheels, of stone metal, and wood, which are made to revolve rapidly, by a steam engine or other power. The cutting of the glass consists entirely, in grinding away successive portions, by holding them upon the surface of these wheels. The first or rough cutting, is sometimes given by wheels of stone, resembling grindstones. Afterward, wheels of iron are used, having their edges covered with sharp sand, or with emery, in different states of fineness, The last polish is given by brush wheels, covered with putty, which is an oxide of tin and lead. To prevent the friction from exciting so much heat as to endanger the glass, a small stream of water continually drops upon the surface of the wheel.

The name of staining has been applied to the process, by which painting, with vitrifiable colors, is executed upon the surface of glass. The pigments used are, chiefly, metallic oxides, which do not exhibit their full color, until they have been exposed to the heat of the furnace. This art has been repeatedly described, as being no longer known; but this is not the fact, except in respect to some particular colors, which are found in the windows of ancient cathedrals.

The metallic oxides, used in staining glass, are difficult of fusion; on which account, it is necessary to mix them with a flux, composed of glass with lead or borax. This renders the oxide fusible, at a temperature which does not injure its color; also by enveloping the particles, it causes them to adhere to the glass, and afterwards protects them from the atmosphere.

A very beautiful violet but liable to turn blue, is made from a flux, composed of borax and flint-glass, colored with one sixth part of the purple of Cassius, precipitated from muriate of gold by protomuriate of tin.

A fine red is made from red oxide of iron, prepared by nitric acid and heat, mixed with a flux of borax, and a small proportion of red lead.

A yellow, equal in beauty to that produced by the ancients, may be made from muriate of silver, oxide of zinc, white clay, and the yellow oxide of iron, mixed together, without any flux. A powder remains on the surface after the glass has been baked, but this is easily cleaned off.

Blue is produced by oxide of cobalt, with a flux composed of fine sand, purified pearlash, and red lead.

Black is produced by mixing the composition for blue with the oxides of manganese and iron.

To stain glass green, it may be painted blue on one side and yellow on the other.

The colors, ground with water, being laid upon the glass, must be exposed to heat under a muffle, so as to be heated equally, until the color is melted upon the surface. To prevent the panes of glass from bending, they are placed upon a bed of bone ashes, of quicklime, or of unglazed porcelain. A bed of gypsum has been recommended, but the sulphuric acid exhaling from it is apt to injure the glass.

Among the ancient specimens of painted glass, some pieces have been found in which the colors penetrate through the glass, so that the figure appears in any section made parallel to the surface. It is supposed that such pieces can only have been made in the manner of mosaic, by accumulating transverse filaments of glass, of different colors, and uniting them by heat, the process being one of great labor. They are described by Winckelmann and Caylus, from some specimens brought from Rome.

The great ductility of glass is one of its most remarkable properties. When heated to a sufficient degree it may not only be molded into any possible form with the utmost facility, but it can be drawn out into the finest fibers. The method of spinning glass is very simple. The operator holds a piece of glass over the flame of a lamp with one hand; he then fixes a hook to the melted mass, and, by withdrawing it, obtains a thread of glass attached to the hook. The hook is then fixed in the circumference of a cylindrical drum, which can be turned round by the hand, and a rapid rotary motion being given to the drum, the glass is drawn in the finest threads, from the fluid mass, and coiled round the cylindrical circumference. M. Reaumur supposed, with great reason, that the flexibility of glass increased with the fineness of the threads, and he therefore conjectured that, if they were drawn to a sufficient degree of fineness, they might be used in the fabrication of stuffs. He succeeded in making them as fine as a spider's web, but he was never able to obtain them of a sufficient length, when their diameter was so much reduced. The circumference of these threads is generally a flat oval, about three or four times as broad as it is thick. By using opaque and transparent glass of different colors, artists have been able to produce many beautiful ornaments. M. Bonnet and others have succeeded in obtaining glass fibers of such fineness and flexibility as to admit of being woven into cloth of a very brilliant, silvery appearance.

### When and Where the Stars and Stripes were First Displayed.

Captain G. H. Preble, of the United States Navy, says the New York *Nation*, is collecting material for a history of the American flag, and has succeeded, he says, in getting together a good deal of anecdote, incident, and evidence concerning its origin, its transmigration (?), and its first appearance in various parts of the world. He informs the "Historical Magazine" that he has now no doubt that the stars and stripes were first displayed on the Thames by the ship *Bedford* of Nantucket. The *Bedford* was a whaler which left Nantucket under a pass from Admiral Digby, and arrived out on the third of February, 1783, twelve days before proclamation of peace was made, and only a week after the London newspapers had got hold of the terms of the treaty. In the London "Political Magazine" of February 7th, of the year above mentioned, is a passage which reads as follows:—

"THE THIRTEEN STRIPS ARE IN THE RIVER.—Mr. Hammet begged leave to inform the House of a very recent and extraordinary event. There was, he said, at the time he was speakings an American ship in the Thames with the thirteen stripes flying on board. This ship had offered to enter at the custom house, but the officers were at a loss how to behave. His motive for mentioning the subject was that ministers might take such steps with the American Commissioners as would secure free intercourse between this country and America."

It is a curious fact that the *Maria*, a vessel that has been named by some writers as a contestant for the honor due the *Bedford*, and which certainly was in the Thames in the course of the year 1783, is still afloat and in use. The Confederate States cruisers forced the old ship to take refuge under the Chilian flag, and she now sails from Talcahuana as a whaler. But the first display of the thirteen stripes in England was not from the masthead of a vessel. When the king, on the 5th of December, 1782, in his speech from the throne, recognized the existence of the United States as a nation, Mr. Copley, the painter, who was among his hearers, went home and put the new ensign into the background of a portrait, that of Elkanah Watson—which he had upon his easel at the time. He had kept the background unfinished, reserving it as a place "to represent a ship bearing to America the intelligence of the acknowledgment of American Independence, with the rising sun of the new born nation streaming from her gaff."

### Interesting Facts.

A legal stone is fourteen pounds in England, sixteen pounds in Holland. A fathom, six feet, is derived from the hight of a full grown man. A hand, in horse measure, is four inches. An Irish mile is 2,240 yards; a Scotch mile is 1,984; a German, 1,806; a Turkish, 1,626. An acre is 1,840 square yards, 1 foot, and 3½ inches, each way. A square mile, 1,760 yards each way, contains 640 acres. The human body consists of 240 bones, 9 kinds of articulations or joinings, 100 cartilages or ligaments, 400 muscles or tendons, and 100 nerves, besides blood, arteries, veins, etc. Potatoes planted below three feet do not vegetate; at one foot they grow thickest, and at two feet they are retarded two or three months. There are no solid rocks in the arctic regions, owing to the severe frosts. The surface of the sea is estimated at 150,000,000 square miles, taking the whole surface of the globe at 190,000,000 square miles. Its greatest depth is supposed to be equal to the hight of the highest mountain, or four miles.

### Transparent Soap.

A patent has just been issued to Morgan W. Brown of New York city, for the following method of making transparent soap:—

Dissolve or melt any settled curd or grained soaps in any suitable vessel to which heat can conveniantly be applied. As soon as the soap is melted and hot, pour into it from twenty-five to thirty pounds of sal-soda, previously melted without water, to every hundred pounds of soap while hot. Agitate the soap and sal-soda and very thoroughly incorporate the paste at a low degree of heat, as it mixes much better than at a high degree. Now pour slowly from 100 to 125 pounds of concentrated glycerin to every 100 pounds of the soap. Keep up a very moderate heat, and agitate the whole until it is a liquid, and thin as a sirup, and as soon as it forms a thin transparent fluid, let it settle well under cover, and draw off the settled fluid into the cooling molds or soap frames, when, as soon as it is cold and hard, it is cut into bars or cakes, in the usual manner, or cast in molds, press, etc.

### Sulphuric Acid and Platinum.

One of the most valuable attributes of platinum, according to the text books, is that it is unacted upon by acids, yet M. Scheurer Kestner, of Thaun, has shown that not only are the platinum alembics acted upon when used in the manufacture of sulphuric acid, but he has also determined the amount of waste. In an apparatus yielding 8,800 pounds of concentrated acid daily, this production, he found, was attended with a loss of one-quarter ounce of platinum, even when the acid was nearly free from nitrous vapors, and as much as two or three times this amount when the acid was no freer from these vapors than it ordinarily is. New alembics suffer less than those which have been in use for a long time, because of the superior compactness of the metal when freshly hammered. For a remedy, he recommends adding sulphate of ammonia to the acid in the platinum vessel, that salt being decomposed by the nitrous vapors, and its base combining, thereby renders them inert. A still better remedy lies in the discovery that platinum containing iridium is much more durable than the former metal alone, and with a knowledge of this fact, all the platinum worked into alembics on the Continent, is now alloyed with a small portion of iridium.

### Apparent Vegetable Growth from Paper.

Take a sheet or piece of ordinary writing paper, say commercial note, and saturate it in a solution of bi-chromate of potassium, 1 oz., with water 3 oz., and dry it in the sun. Cut the paper into squares of about three inches and double them back and forth until the form—a zigzag section—will stand on a table, and ignite the top of the slip. The result will be a slow combustion, the products of the combustion growing out of the edge of the paper like spears of grass and curling over to represent very faithfully the curving and depending leaves of the palm and cane. If the process is carried on without drafts of air the final result will be a bunch of beautiful blue-green filaments, while the process of combustion itself will prove a means of pleasant recreation.

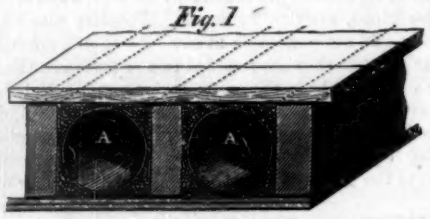
PROCESS FOR COVERING IRON AND STEEL WITH COPPER WITHOUT A BATTERY.—This process, due to Herr Graeger, is described in a recent number of the *Polytechnisches Notizblatt*. The objects are first well cleaned, and then painted over with a solution of protochloride of tin, and immediately afterward with an ammoniacal solution of sulphate of copper. The layer of copper thus produced adheres so firmly to the iron or steel, that the different objects can be rubbed and polished with fine chalk without injuring the deposit. The tin solution is prepared with 1 part of crystallized chloride of tin, 2 parts of water, and 2 parts of hydrochloric acid. The copper solution, with 1 part sulphate of copper, 16 parts of water, ammonia sufficient to redissolve the precipitate formed when it is added. Zinc and galvanized iron can be treated, according to Boettger, directly by the copper solution, without using the tin salt. The above process may be found useful by gilders, and for various ornamental purposes.

M. Blondlot asserts that when phosphorus produces ozone by its slow combustion in presence of water, phosphoric acid is produced, which, in contact with excess of phosphorus, is partly transformed into phosphorus acid.

## PROTECTION OF BUILDINGS AGAINST FIRES.

The guarding of buildings against the destructive agency of fire, is a subject worthy the attention of builders and property owners, and, in fact, important to all, especially those who dwell in thickly settled neighborhoods. Confining the fire to the floor or floors in which it originates, will frequently prevent an extensive destruction of property and the danger to life so often experienced in our crowded cities. The well known firm of R. Hoe & Co., manufacturers of printing presses and materials, in New York city, have been lately experimenting on a new plan of constructing ceilings and floors, intended primarily to ascertain the best method of preventing conflagration in the new building now in course of erection by the company, and calculated also to be of value to future builders.

*Fig. 1*

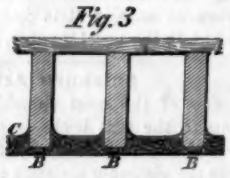



One of the firm says: "Many years since, I saw a store on fire in the Rue Vivienne, Paris, and was not a little surprised to see persons looking out of the windows in the story above the fire, quietly observing the labors of the firemen engaged in extinguishing the flames. Knowing that fires were rare in Paris, I was interested in examining the method of construction of buildings which inspired such confidence. I found that the floors were filled in solid with plaster of Paris.

"About ten years ago," he says, "our firm had occasion to enlarge our iron foundery, and it could be done only by carrying the extension under our carpenter and pattern shop. I caused the ceiling to be covered with sheet iron, and as each sheet was nailed up, it was covered between the beams with lime and sand mortar from three quarters to one inch in thickness. This was considered quite a security by our fire

*Fig. 2*

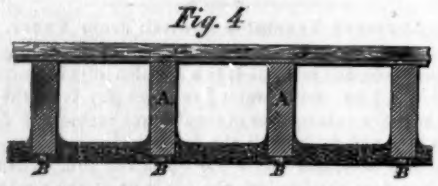
*Fig. 3*




insurance surveyors; but it was never quite satisfactory to me as a perfect protection. Last year, our firm had determined to erect a fireproof addition to our factory, and I was considering how we could, at a moderate expense, make the old portion of our works comparatively fireproof. In conversation with Mr. R. G. Hatfield, architect, he suggested that to reduce the weight it would be well to put in iron pipes between the beams, and fill in with plaster of Paris; this made the basis of my first experiment, seen in Fig. 1. Other experiments have been made, as shown by the remaining figures."

Fig. 1 is a representation of the construction of floors for the experiment referred to above. Upon the under side and across the beams were nailed strips of pine half an inch thick, and dovetail in section, serving to retain a ceiling of plaster of Paris, spread under the beams on the strips to the thickness of one quarter of an inch, and on their tops, between the beams, to a thickness of one half an inch. Upon

*Fig. 4*




this were placed, between the beams, tubes, A, of thin sheet iron, in this case of a circular section, or they may be made oval or rectangular, according to the spaces between the beams. The remaining space was filled in with plaster of Paris, completely enveloping the tubes. After the plaster had set, the flooring boards were fixed, and the plaster allowed to become perfectly dry and hard. A fierce fire was then lighted, within four feet of the ceiling, and kept up for four and a half hours. The result was, the plaster had cracked off in places, and the dovetailed strips were charred, but the beams were not injured, the fire having scarcely blackened them, and the floor above was never so heated but that a person could have stood on it barefoot without discomfort.

Fig. 2 represents a second experiment. Upon the under side of the beams, A, were nailed sheets of thin iron, crimped in a form to present dovetails, B, with the large parts downward. This was plastered with a "scratch" coat of sand and lime, and on this was placed a coat of one quarter of an inch of plaster of Paris. When dry and hard, a fire was lighted and kept up for two and a half hours, when the plaster cracked off and the beams began to burn.

In Fig. 3, strips of pine, B, one half inch square, were secured to the center of the beam, throughout their length. Plates of sheet iron, No. 21 wire gage, were nailed upon the strips, which kept the iron half an inch from the beams. Plaster of Paris was poured on the sheet iron to the depth of one and a quarter inches, and the sides and tops of the beams smeared with it, and rounded up at C, to some two inches on the sides. After the plaster had set, the floor boards were fixed, the fire lighted and kept burning for four and a half hours. The result was, in a few places a smoked appearance of the beams, but no other indications of fire.

Fig. 4 is a modification of Fig. 3, with the addition of thin sheets of iron on the tops of the beams, coated with plaster of Paris one quarter of an inch thick, on which the flooring was laid. The experiment with this device we witnessed a short time since, and for three hours a raging fire was kept burning under the ceiling, and for three hours more a fire was kept burning on the floor itself. The result was that no damage was done, and the floor proved to be entirely fireproof.

The following figures show the cost of this improvement: Cost of 10x10 ft. of fireproof flooring, prepared as per experiment, over and above the cost of ordinary flooring: Average thickness of plaster Paris, 1¼ ins.—equal to 12½ cubic feet for the square of 10x10 ft., equal to three barrels of plaster, at $2 85—$8 55. Sheet iron on top and bottom, 200 square feet, No. 21 wire gage, 280 lbs. at 6c., $16 80; mason's and carpenter's time, five hours each, $4 75; total cost for square 10x10 feet, $30 10. The cost for a fireproof floor 100x25 feet, less walls, would be $678 45 more than the cost of the common combustible flooring. The cost of a brick and iron beam fireproof building is more than double the cost of a brick and wood structure.

## HOW TO TEST THE PURITY OF WATER.

It is of importance to be able to test the quality of water, not only when for special purposes absolutely pure water is required, but even in cases where such purity is not requisite, it may be of great interest to ascertain of what the impurities consist. The following short notice of the tests for the most commonly occuring impurities, will be welcome and useful to many of our readers.

PURE WATER MUST SATISFY THE FOLLOWING CONDITIONS.

1. It must have no residue whatever when evaporated in a clear porcelain or platina dish.

2. It must form no precipitate with a solution of nitrate of silver, which would indicate common salt, some other chloride, or hydrochloric acid.

3. It must not precipitate with a solution of chloride of barium, which would indicate a sulphate or sulphuric acid.

4. It must form no precipitate with oxalate of ammonia, as this would indicate some soluble salt of lime.

5. It must not assume any dark or other shade of color when passing sulphureted hydrogen gas through it, or mixing it with the solution of a sulphide salt, as this would indicate the presence of lead, iron, or some other metal.

6. It must not become milky by the addition of lime water, or a clear solution of sugar of lead, as this would indicate carbonic acid.

7. It must not discolor by adding solutions of corrosive sublimate, or chloride of gold, or sulphate of zinc, which discoloring would indicate the presence of organic substances. When boiling water with chloride of gold, the least trace of organic matter will reduce the gold, and color the water brown.

RESULTS OF THESE TESTS.

1. Almost all spring waters are found to leave a residue upon evaporation.

2. Common salt is not only found in most springs and rivers, but even in rain water, many miles inland, when the wind blows from the ocean.

3. Sulphuric acid and sulphates are found in many springs, the Oak Orchard Spring, N. Y., for instance, is very rich in the free acid.

4. Waters from lime regions all contain lime in large quantities, and, in fact, this is the most common impurity of spring waters.

5. Iron is contained in large quantity in the so-called chalybeate springs; also copper and other metals are encountered; lead incidentally, by the lead tubes through which it often is made to pass.

6. Carbonic acid is the most common impurity, even distilled water is not always free from it. Water will naturally absorb carbonic acid gas from the atmosphere, which latter always contains it; its principal source of supply being derived from the exhalations of man and animals.

7. Organic substances are often found in the water of running brooks, streams and rivers, and are of course obtained from the vegetation and animal life in the water itself, and from the shores along which it floats.

REMARKS.

1. The healthfulness of water depends on the nature of the residue left after evaporation; for many chemical and other operations, where absolutely pure water is required, the leaving of residue at once proves the water unfit for use.

2. The existence of small quantities of common salt in the water is not objectionable, it being not injurious to health.

3. Sulphuric acid and sulphates may be objectionable for daily use; however, such waters are used medically to stop diarrhea and excessive tendency to perspiration.

4. Lime waters do not agree with some constitutions, producing diarrhea and diverse disturbances; very small quantities of lime, however, are not injurious.

5. Iron is healthy, and is a tonic; in fact, this metal and manganese are the only ones which may be used in large doses, not only with impunity, but even with benefit: however, there is also a limit. Over doses of iron may produce diarrhea and slight eruptions of the skin, or pimples.

6. Carbonic acid is not objectionable when drinking the water; on the contrary, it makes it more palatable, and most mineral waters owe their reputation to this substance.

7. Organic substances are perhaps the most objectionable, principally when decaying; such waters may even propagate diseases, and require careful filtering or boiling, or both, to make them fit for internal consumption.

There are a great number of mineral waters of diverse celebrated springs, which contain many other substances, but usually in very minute quantities; only it is beyond our present intention to go into details about substances not commonly encountered.

## WAGNER'S IMPROVED DINNER PAIL.

The extent of the "tin pail brigade" which any early riser in our cities and manufacturing towns may see, comprising the honorable guild of the country's wealth producers, proves the value and importance of such a device as that shown in the accompanying engraving. The object is to furnish a handy and convenient receptacle for food, designed for workmen and tourists, and it is so constructed that the aroma of one kind of food will not affect the flavor of another. The cups, A, B, C, D, sit one upon and partly within each other, being supported in position by flanges near the bottom and projections at the top. The lower one, D, has ears, E, to which is pivoted a bail or handle, F, held in an upright position by means of a pin on each side engaging with a corresponding hole in the springs, G, secured to the upper cup, A. Thus all the compartments are firmly locked together. This top cup is designed for holding coffee, tea, milk, or other beverages, and has a spout, H, fitted with a cork, and a receptacle on the top for salt or other condiment, covered with a drinking cup, I. A clasp on the side serves to hold a knife and fork, or spoon.

With this device a dinner of several kinds of food may be carried safely, the vessels holding each sort serving as dishes from which the food may be eaten.

Patented through the Scientific American Patent Agency, March 31, 1868, by John Wagner, who may be addressed for purchase of rights at Cumberland, Md., care of S. J. Edwards

## An Air-tight Galvanic Battery.

Mr. Chester, electrical instrument maker, of this city, describes in the pages of a contemporary a new form of galvanic battery, the beauties of which are cleanliness, portability, and power, besides entirely dispensing with acids, preventing evaporation and the generation of gas, and obviating the removal of the exciting fluid when the battery is not in use.

The battery is made up of glass cells three inches long and one inch in diameter, inserted in a wooden block; a zinc cover is provided for each glass, and a projection from this zinc cover, running down into the glass, forms the zinc element The other element is carbon, carefully connected with platinum, and well insulated from the zinc cover. This cover has a plate of soft rubber interposed between it and the glass top, and the packing is made completely air-tight and water-tight by the pressure of two rubber springs pulling the cover firmly down. Connection from one cell to the next is quickly made by short pieces of spiral springs. The battery is charged by filling the glasses half full of water, adding some bisulphate of mercury, and a little shred of cloth is interposed between the plates so as to retain moisture. To use this battery it is necessary to invert it, and thus allow the fluid to flow over the plates and saturate the piece of cloth. Restoring the battery, the fluid leaves the plates, though a drop remains in the cloth shred, and in this state, simply from these drops of moisture, powerful intensity currents, producing violent muscular contractions, are given off, and this is the case even forty-eight hours after the immersion of the plates. It is evident that if we can employ these currents, resulting from the simple expenditure of one drop of the fluid, usefully, that we have exhausted a very small portion of the force in reserve, and it is also evident that we

can, after use, place the battery out of use for an indefinite time, ready, by the expenditure of another drop of fluid, to give off the desired currents. Properly constructed, we cannot see any reason why the arrangement should not last in good power a year or more for occasional effects; and it can be completely renewed at the rate of fifty cells in one hour. One hundred and fifty cells exceed in intensity one hundred cells of Grove. The parts are all quickly replaced, no acid is used, and no gas generated.

A modification of the construction is made use of when it is wished to employ a fluid of greater energy, but which in decomposition produces gas from which the tight cell must be relieved. Insert a tube through the cover, the opening being just half way down the cell, and the surface of the fluid below. Care being used in inverting the battery, this tube orifice is always in the air space of the cell, whether upright or inverted. When, for convenience, a battery of large quantity is desired to be used occasionally, large glasses and elements are employed; but bolts are substituted for the rubber bands to bind down the zinc covers. An exceedingly convenient battery is thus formed for electric cauterization, where however, in batteries of high [illegible] to bolts, or their equivalents. The very high insulation of this packed battery is evident from the retention of its power for forty-eight hours and more, where the exciting power is derived from a mere drop of fluid.

## POSSIBILITY OF SPEECH BY THOSE HITHERTO CONSIDERED MUTES.

The majority of the unfortunate class who are deprived of speech are so, doubtless, not because their vocal organs are defective, but because from early infancy they have been devoid of hearing. To consciously imitate sounds which they cannot hear is, of course, impossible to them, yet it has been proved possible for them to acquire the vowel and consonant sounds of spoken language, by the attempt to imitate with exactness the appearance of speech in those having perfect organs. The *Cornhill Magazine* for January, of the current volume, gives a very interesting account of an institution in Brussels where the dumb are taught to speak in the manner alluded to. Of course, such persons must substitute the eye for the ear in conversation.

In the case of those in whom the vocal organs are defective, no amount of effort will suffice to produce perfect speech. Trivial defects may, perhaps, be overcome by resort to artificial means; the inordinate length of the tongue, or the loss of the front teeth, or even a portion of the palate, are examples. But the loss of the communication between the lungs and the other organs of speech, the supply of air to the larynx and the vocal chords, would seem to be so radical a defect that speech would from the time of its occurrence become utterly impossible.

In 1862, a case was reported to the Medical Society of the State of New York, of which we give a brief extract.

A young woman, aged twenty-three, attempted to take her life, while temporarily deranged, by cutting her throat with a razor. The crico-thyroidean membrane, the cricoid cartilage, and the upper ring of trachea, were wounded. No large-sized blood vessel being severed, the wound was dressed in the usual way, and at the end of three weeks had entirely healed, with the exception of a small opening in the windpipe just below the cricoid cartilage. Attempts being made to close this opening, and strong symptoms of suffocation immediately manifesting themselves, it was found imperative to insert a silver tube, known to surgeons as the tracheotomy tube, into the reopened tracheal wound, and to keep it there for several days, when a second attempt was made to close it, with the same results. This time several weeks were permitted to elapse, when a third attempt to heal the opening was made, which caused such immediate and urgent difficulty in breathing that it was abandoned altogether. From that time until she died from other causes, a period of some nineteen months, she wore and breathed through the tracheotomy tube. Upon her death, a post mortem examination revealed the fact that the windpipe was completely closed at the upper portion of the lower third of the cricoid cartilage, by a perfectly-organized and firmly-attached dense white fibrous tissue.

The circumstance which renders this case remarkable, and applicable to the subject under consideration, is the fact contained in the following paragraph, which we copy verbatim from the report referred to:

"Closing the opening in the trachea with the fingers or handkerchief, would immediately cause suffocation, proving that no air could pass through the larynx, yet she could speak in an audible whisper; she improved much in articulation, and this improvement continued during life; was able to sound all the letters, and by placing the ear near her mouth, she could converse and readily convey her ideas in an audible whisper. She enjoyed excellent health up to about four days before her death."

This case was regarded as so remarkable that some subsequent experiments were made upon the possibility of speech without a supply of air to the vocal organs through the trachea from the lungs. The conclusions drawn from them have never before been made public so far as our knowledge extends, but they corroborated the account which we have given above. Upon trial it will be found quite possible to articulate in strong whispers short combinations of syllables, while the air is being drawn into the lungs through the nasal tubes. The air contained in the cavities of the mouth anterior to the arch of the palate being sufficient for the purpose. Those accustomed to the use of the blowpipe will readily understand this, as it is customary for them to keep up a continuous blast, both while inhaling and exhaling the breath through the nasal tubes. In speech, upon this principle, the air is forced out in the same way as in the use of the blowpipe, by the contraction of the muscles which surround the mouth (principally the buccinator), and great exertion of these muscles is required, giving an appearance of violent contortion and great effort, an appearance strikingly characteristic of the case above described. The air, as it is expelled, is, by the proper shaping of the articulating organs, formed into vowel and consonant sounds.

One of the glories of the present age is the amelioration of the condition of such as are born without sight, speech, or hearing, and any thing that aids in the remotest manner such a benevolent work, cannot fail to be of interest and profit.

## New Views of Ozone.

That able and energetic chemist, M. Houzeau, has classed the conditions in which oxygen exists in the atmosphere under three heads: First, inactive oxygen, which produced not the slightest perceptible action upon moist iodureted paper; secondly, oxygen directly active, which immediately imparts a bluish tint to the above description of paper, developing at the same time a peculiar and characteristic odor; [illegible] oxygen indirectly active, possessing no perceptible odor and requiring the aid of another body to affect the test paper. The invigorating nature of country air is presumed to be due to the presence of of the second of these modifications of oxygen, which may be regarded as identical with the substance ozone. It cannot be caused by the first description of gas, since inactive oxygen does not affect iodine or its preparation, nor to the third class, since oxygen, indirectly active, requires the aid of an acid to affect the test paper. But the air of the country, although it imparts a bluish tint to slightly iodureted litmus paper after the lapse of a short time, does not redden the most sensitive litmus, even after it has been submitted to its action for many hours. It effects its complete discoloration, but does not redden it. Having demonstrated that the first and third of the presumed modifications of the gas oxygen do not bestow upon country air its peculiar properties, it is but natural, and moreover reasonable, to attribute them to the presence of the second, or ozone proper. Granting this assumption, it is manifest that the odor which invariably betrays the existence of ozone should also be present in the air, and unquestionably so it is. Whenever pure air is respired in the mass, it has not only a distinct smell, but also a distinct color. It would be in vain to seek for this air in the crowded streets of a metropolis, but in the open country the lungs can appreciate the vital energy they inhale. All sceptics who doubt the accuracy of these statements, are advised to first of all familiarize themselves with the smell of diluted ozone or vitiated air, a thing easily accomplished, and then, after sleeping in a close room, to inhale the fresh morning air immediately after rising. They will find that the more the air in the chamber has been contaminated and infected, the stronger and more palpable will be the difference in the odor of the two currents.

In support of his theory, M. Houzeau carried out an experiment, which is at once curious, interesting, and conclusive. Being well aware of the property that flannel and other stuffs possess of condensing in their pores diluted ozone or oxygen, he caused two linen cushions to be prepared of precisely the same material and size, and placed one in the open air, and the other in a room badly ventilated and well filled with company. After the expiration of a certain time he had them both brought to him, and ascertained that the first emitted a distinct odor similar to that of ozone, while the second was completely inodorous. Fresh air in its normal state is endowed with decided powers of decoloration. Litmus and turmeric paper, exposed to its influence and sheltered from the effects of rain, dew, and sunlight, are blanched in a short time, demonstrating that ozone acts energetically as a decolorizing agent. It has long been known as a powerful disinfectant, and could means be devised for procuring it in a free state it would be of the greatest advantage in purifying vitiated atmospheres.

## Japanese Coal Mining.

Coal has within the last ten or twelve years been discovered among the hills about four miles from Hiogo. I had an opportunity while there (says Mr. Locock in his report) of visiting the works, if indeed they deserve the name, which have been undertaken for procuring the coal. Here and there, wherever the coal or shale which lay over it had been seen cropping out from the hill's side, a horizontal passage had been run in, never more than twenty-five feet, and often only ten or twelve feet. In some of these burrows two or three men, crouched to the ground, were at work icking away at the sides with pointed hammers, and sorting each little piece of coal with their hands before throwing it into one heap or another, according to its quality. A few coolies, in the last stage but one of nudity, collect the coal at the mouths of these burrows, and carry it to where the road admits of its being transferred to the backs of bullocks, or to three-wheeled carts, holding about half a ton each, and drawn by one beast. In this way it is brought to the Hiogo market. A great portion of it is of a very inferior quality. Here and there, however, good specimens of a kind of anthracite are brought out from the hill's side. The seam which has been discovered is about two feet thick, and runs down toward the plain at an angle of about 15 degrees, or very nearly that of the hills themselves. There is, therefore, good reason to believe that by boring in the plain below, the same, if not a better seam might be discovered. The Japanese government are not insensible to the advantages to be derived from a more scientific working of the coal of Hiogo, and it is not impossible we may, ere long, see a regular coal mine opened, worked by European machinery.

## A New London Omnibus.

The English Parliament has refused to grant the petition of Messrs. Noble & Co., praying for a permit to lay rails and run city cars in the streets of London. The scheme, to which we have before referred at length, was killed by the omnibus companies, who, fearing the advent of so formidable a rival for public patronage, were enabled to command a powerful and successful opposition. Horse-cars being, temporarily at least, proscribed, a species of concession has been made in the adoption of a new vehicle, which promises well for the public convenience and comfort. By direction of the Home Secretary, a trial was recently made of this curious style of conveyance—which, from the description, would seem to be a cross between an omnibus and a Hansom cab or doctor's gig—and an official report will soon be forthcoming.

The chief peculiarity of the omnibus consists in its having only two wheels, and in being drawn by three horses, attached to the coach by the means of four shafts. For the purpose of preventing noise, the shafting and framework of the running frame are put together as one piece, and are composed entirely of angle and bar iron. The carriage body rests on the top of the iron frame on four india-rubber cylindrical buffer springs, and swings entirely free of the axle; the construction preventing the ordinary sharp rattle experienced in omnibuses, and allowing conversation to be carried on freely between passengers. For the latter, sixteen inside and twenty outside seats are provided. These are arranged like the teeth of a saw, each presenting a corner to the one on the opposite side, so that the occupants sit at an angle of about 60° with the side of the omnibus, and are not obliged to make such extended observations of vacancy or each other's faces during a prolonged journey. The new vehicle is pronounced, as a public carriage, superior in every respect to any conveyance now in use. We have not seen engravings of this novel carriage, but hope to obtain some for publication if it is approved.

## Vitrified Surface on Cast Metal.

An invention has recently been patented by Messrs. Horsley, of London, and which has for its object improvements in the production of a glazed or vitrified surface on cast metal. In producing castings of iron or other metal, they coat the mold and core with powdered glass, furnace cinder, or enamel, or other material capable of being vitrified by the heat of the melted metal when it is poured into the mould, so as to form a glaze or enamel on the surface of the casting. The operation is as follows: Prepare a mold in the usual manner, either of common sand or red loam sand, and either with or without cores, as the case may require. When the mold is finished, paint it over with a paint-like composition prepared by grinding together gas tar and common black lead, in the proportion of about two pounds of black lead to a gallon of tar. Immediately dust over it finely-ground window-glass, or green bottle glass, or slag from a blast furnace may be used, as may also other vitreous materials or enamel compositions, such as are used for enameling articles of wrought and cast iron; but when casting iron, ground glass is preferred. Any excess of the powder is dusted or blown off, and the mold is allowed to dry, or is dried by artificial heat, until the composition on its surface is set and hard, so that it will not rub off. The metal is then run into the mold in the usual way, the heat fuses the vitreous material with which the mold is lined, and causes it to form a glaze on the surface of the casting. The paint-like composition by which the powder was made to adhere to the mold also serves as a separation when the fusion takes place, and so a smooth face is ensured. This process is more especially applicable when casting iron, but it may also be applied advantageously in some cases when casting brass and copper, the vitreous material employed being such as fuses readily with the heat of the melted metal.

## The Flying Man.

At the recent meeting of the Aeronautical Society, it was announced by Mr. Wenham, that one of the members of the society, Mr. Spencer, had already constructed an apparatus, by the aid of which he had accomplished the feat of raising himself from the ground level and performing a horizontal flight of 60 feet; and it was further stated by Mr. Wenham that Mr. Spencer expected to fly the length of the Crystal Palace during the meeting of the Aeronautical Society to be held there next month. Since the above announcement was made, we have received from Mr. Spencer some particulars of the apparatus employed by him. It consists of a pair of wings of rather small size, arranged so that they can be worked by the arms, and a large fan-shaped tail of very light construction, connected to the body by basket work, so that it stands at an angle of about 3° with the horizontal. Mr. Spencer does not profess to fly in the ordinary sense of the term. He uses his apparatus by taking a short, quick run, this run being continued until, by pressure of the air against the under surface of the tail, he is raised from the ground. He then, by using the wings, maintains the momentum which he has acquired as long as possible, and is thus enabled to skim along at a short distance above the ground. Mr. Spencer commenced his operations by practicing long jumps without the aid of apparatus, and he then commenced using the wings, and finally added the tail. By continued practice, and from time to time making alterations in his apparatus, Mr. Spencer has been enabled to extend considerably his early flights or "skims," and we were informed by him a few days ago that he had lately accomplished a flight of 180 feet, starting and alighting at the ground level. Mr. Spencer is now engaged in completing a new apparatus, which he hopes to finish in time for the exhibition of the Aeronautical Society at the Crystal Palace, and we look forward with some interest to witnessing its performance.—*Engineering.*

## THE UNITED STATES ASSAY OFFICE IN NEW YORK.

We condense from one of our city cotemporaries the following in relation to the United Assay office, in this city:—

Adjoining the sub-treasury in Wall street is a granite building of modest appearance, bearing over its entrance the words "Assay office." It is fitted up in the same style as a broker's office, and three or four clerks appear to be quite able to transact all the business pertaining to this Bureau without over-exerting themselves. In fact, it would not appear at a first glance that much business is ever transacted there; yet there from $14,000,000 to $15,000,000 of the precious metals are received and accounted for during the year. The larger portion of this is in the form of gold dust from California, Nevada, Montana, and Idaho. Much the larger portion of all the bullion received is either in the form of dust, grains, bars, or amalgam. A comparatively small quantity comes in the shape of gold and silver plate, watch cases, foreign coin and ornaments. These are sent in by jewelers or private parties to be remelted, for plate, watch cases, and ornaments change their fashion like other things of less value, and have to be remodeled to be salable.

Few persons are aware of the actual quantity of gold produced by our mines since their first discovery. In a recent official report this amount is placed, in round numbers, at $1,000,000,000. Since 1849 California has produced $900,000,000. Her productive powers, however, for the last thirteen years have steadily decreased, and for 1869 the estimate is only $25,000,000. Montana has produced $65,000,000; Idaho, $45,000,000; Colorado, $25,000,000. The estimated production of Nevada in 1869 is placed at $20,000,000; of Montana, $12,000,000. It is believed that not more than 50,000 persons are now engaged in mining in this country—a considerable falling off from the numbers of previous years.

The deposits received having been carefully weighed and a certificate given, are numbered and sent at once to the melting room, a spacious apartment provided with furnaces, tanks, etc., and floored with iron tiles. Each deposit, or as much of it as can be conveniently handled at once, is placed in a crucible, and as soon as melted is poured into iron molds. If the deposit is of gold, two pieces are cut from the lump and set aside for the Assayer. If of silver, a small portion of the fluid metal is dropped into water, which granulates it, and these granules are used by the Assayer. The crucibles are carefully scraped after being used, so that not a particle of the metal is lost, for the Assayer, it must be understood, has to account for every grain of the metal received.

About 7½ grains of gold are used it each assay. This small quantity, with the right proportion of silver, which is estimated by the Assayer with an accuracy attained by incessant practice, is placed in a cupel—a cup of calcined bone—and deposited in a small furnace heated to redness. A strong current of air passes over the contents of the cupel, oxydizing the lead. The oxide dissolves the oxides of the other base metals, which are absorbed by the cupel, and the result is a button of pure silver and gold. This button, after being hammered and rolled, is placed in a bottle partly filled with nitric acid, which is set in a sand bath. This acid dissolves the silver, leaving the gold untouched. When the process is finished, the pure gold left in the cupel resembles tinder. It is then annealed, rendered into a compact coil, called the "cornet," and weighed. The weight gives the exact amount of pure gold.

Two pieces were, it will be remembered, taken from the metal after it had been melted. Each of these pieces is assayed separately, and the results must, of course, agree. If they should not do so, it is evident that a mistake must have occurred somewhere, and the whole process has to be repeated.

As soon as the assays are completed the Assayer reports to the Assistant Treasurer of the United States, and, on this report, the depositor is paid. If he desires to receive gold coin, one-half of one per cent is charged. For gold bars, which are handier for shipment, he has to pay six cents for $100. For every ounce of pure gold which his deposit has yielded, he receives $20·672, less the charges stated above. Depositors of silver receive its full value, less what is called the "parting charge," which is about five cents per ounce. Brittle metal has, however, to be toughened, for which there is an extra charge. The private assayers of California, before the establishment of a Government Assay Office there, used to make no charge for the assay, taking their pay out of the drippings from the crucibles. The Government Assayers account for the entire weight of the deposit.

The depositor having received the full value of his deposit, the latter of course becomes the property of the Government, and it now has to undergo a process called "parting" before it is sent to the Mint, or used in any way for commercial purposes. In parting gold, silver is added in the proportion of about two parts in weight of silver to one of gold. Formerly no account was taken of the silver already in the gold, but Mr. Mason, in charge of the melting and refining department, found that a great saving might be effected if it was first ascertained how much silver the gold bullion already contained. This practice is now carried out, and instead of invariably adding two parts of silver to one of gold, only sufficient silver is added to make the proportions above stated. There is thus a saving, by Mr. Mason's method, of about 30 per cent in the material, and in one year the sum of $22,000 was saved. The mixture of gold and silver is next melted, thoroughly mixed, and poured into water, by which it is granulated. The granules are placed in porcelain jars containing nitric acid. Heat is then applied, and as the acid boils, the yellow fumes which our readers have doubtless so often seen proceeding from the chimney of the Assay Office, are given off. This process goes on for about twenty-four hours, when the jars are emptied, and in the bottom is found a brown substance resembling mud or anything else upon earth rather than "gold—glittering gold." It is in fact, however, pure gold, or at least, very nearly so. The silver has been dissolved by the nitric acid, and is in solution. It is carefully put aside for future treatment, for in the Assay Office nothing must be lost or wasted. The brown substance found at the bottom of the jars is placed in large wooden tubs and washed by percolation in warm water until all traces of acid have disappeared, and it is said to be "sweet."

The gold is then of ·940 fineness. Formerly it was subjected to a second boiling in nitric acid, which left it about ·993 fineness, but by the process at present in vogue it is treated with sulphuric acid, by which a fineness of ·998 is attained. This is termed pure gold, although it is not actually so, but to deprive it of the two parts of alloy it now contains would involve an expenditure of time, money, and trouble altogether useless. After its treatment with sulphuric acid, the gold, which still looks more like red mud than a precious metal, is again washed until "sweet." It has now a redish yellow hue. After being dried, it is taken to a hydraulic press, where it is made into "cheeses," so called from the color and shape. The cheese made in the Assay Office is richer far than the most fertile vales of Gloster ever produced. Each "cheese" is but thirteen inches in diameter, but it is worth about $20,000. These cheeses are baked in a ... heated by steam until all remaining moisture is expelled, when they are remelted, cast into bars or bricks, assayed and stamped with the weight, fineness, and value. And now they look like gold indeed.

The reader will remember that the nitric acid poured over the gold and silver granules, in the porcelain jars, and now containing a large quantity of silver in solution, has yet to be disposed of. A solution of chloride of sodium—common salt—is first added to the solution, and a deposit of white powder is the result. This powder is chloride of silver. The next process is to free the chlorine from the silver, and this is done by placing it in vats with granules of zinc. The chlorine and zinc readily combine, and the silver is set free in the form of a light gray powder. This like the gold, is washed, pressed, and formed into "cheeses" worth $800 each. These are melted, weighed, stamped, and ready to be disposed of as occasion may require. The silver obtained by the above process contains but one part of alloy in 1,000. Some silver is so pure that it requires no "parting," and, after being assayed, is sent at once to the mint.

The Assay Office was established in this city in October, 1854, and since that time over $160,000,000 have passed through the hands of its officers.

## BAROMETERS AS INDICATORS OF THE WEATHER.

As indicators of weather, barometers have fallen somewhat into disrepute; and yet, when used in connection with other instruments, they are very useful in foretelling what the probable state of the weather will be within reasonable limits. In many cases they are to be found hanging by themselves, and scarcely ever referred to, on account of their supposed liability to error. The usual weather marks upon the dial of a wheel barometer very often deceive the superficial observer.

A barometer indicates only two of the conditions upon which weather changes depend, viz., weight of the air dependent upon moisture, and disturbances in the atmosphere more or less remote, according to their violence.

In certain latitudes, a sudden fluctuation of the mercury is always to be regarded as an indication of foul weather; but it is not necessarily an indication of rain, although a violent disturbance of the atmosphere is generally attended with more or less condensation of the moisture which it holds in suspension.

If a barometer were sufficiently delicate in its operation to show the disturbances which take place at a great distance from its location, and which take place in rapid succession, at from twelve to twenty-four hours previous to heavy storms, it would be far more reliable than the ordinary instruments, which, although they are sensitive to remote disturbances, do not show them with sufficient plainness to be easily observed in the ordinary method of reading the instrument. It is also so inconvenient to make such observations with sufficient frequency to take account of the rapid and slight variations dependent upon such remote causes, that they usually elude observation. Recent experiments, however, go to show that they are most important in their relations to weather phenomena.

It is frequently the case that when air is in the same hygrometrical condition, that the mercury in the barometer will move in different directions within an interval of three hours, proving that weight, or, more properly, pressure of the atmosphere, does not depend upon the moisture held in suspension solely, but also upon the waves produced at a distance and communicated through air, very much as winds at sea produce heavy swells very far from the place where they acting directly upon the water.

Changes in weather depend upon atmospheric disturbances, and the nature of the change depends upon the temperature, and the hygrometical condition of the atmosphere. A barometer used together with a thermometer and a hygrometer, and the indications of change shown by the barometer, interpreted by the indications of the two latter instruments, will be found more reliable than is at present currently believed.

DRILLED VS. PUNCHED HOLES.—A large number of specimens of steel plates were recently tested at Chatham Dockyard, to determine the difference in strength between steel plates with punched and drilled holes. Although the pieces were so prepared that they should break at the smallest part, they all, without exception, fractured at a place where two small holes had been punched. But when the holes were drilled, and in the largest sectional area of the steel, they as uniformly broke in the smallest part, exactly the reverse of the previous trial. From this and other experiments the advantage in tensile strain, gained when the holes are drilled rather than punched, was calculated to be 22·5 per cent.

## MANUFACTURING, MINING, AND RAILROAD ITEMS.

During the construction of a mountain tunnel for the Don Pedro II. railway, of Brazil, a temporary road of five feet three inches gage was laid over the mountains, having the extraordinarily short curves of 230 feet radius, on gradients 296 feet to a mile, or a little steeper than one in eighteen. The line was regularly and successfully worked for three years, with six-coupled and eight-coupled engines. The former were provided with trucks under the leading ends, the others with an arrangement for permitting the end wheels to traverse laterally.

The town of Winchendon, Mass., claims to manufacture more wooden ware than any other town in the world. Two of the largest firms turn out $500,000 and $400,000 worth per year, respectively, and the smaller establishments of the place make the aggregate annual product of the wooden ware interest mount up to over $1,000,000. In addition to these factories, Winchendon contains two cotton mills, two bobbin factories, two machine shops, and two sewing machine manufactories.

The dimensions of the heavy express engines, on the Great Northern railway of England, referred to in our ... number, and coupled together; leading and tender wheels, 4 ft. 3 in. in diameter throughout; barrel of boiler, 10 ft. 1 in. long by 3 ft. 10 in. in diameter inside, in the smallest part; fire-box casing, 6 ft. 4 in. long by 4 ft. wide outside; cylinders, 17 in. in diameter, with a stroke of 24 in.; heating surface in box, 114¼ square feet, and in the tubes 907 square feet, making a total heating surface of 1,021¼ square feet, with a grate surface of 19⅝ square feet. The tenders hold 2,500 gallons of water, and two tuns of fuel. The propelling power of each engine is equal to 12,000 lbs., and the adhesion on the rails may be taken at 11,700 lbs.

Gold prospecting in Siberia is carried on after a somewhat singular plan. The mines are an object of much attention on the part of the Russian government, and while it is opened free for any one to search for gold deposits in any part of the territory, the successful discoverer is obliged to report to the nearest government official, who apportions him a space of about four square miles, on condition that all the precious metal he obtains is to be carried to a government depot, where it is coined into money, the proceeds, less fifteen per cent for expenses, being then paid to the discoverer.

The bridge over Dale Creek, upon the highest summit of the mountains where the Union Pacific railroad crosses, is a pine timber bridge, 640 feet in length and 135 feet above the creek. The structure was all built, ready for the transit trains, in the short space of thirty-five days.

The recent report of the directors of the Pittsburg, Fort Wayne and Chicago railway, shows that the deterioration of iron rails necessitates the relaying of their whole road with new iron every four years, and that the cross ties for the entire line must be replaced every four and two thirds years. The great wear of rails is attributed to the increased weight of locomotives and cars that of late years have gradually and almost imperceptibly come into use. When steam power was first applied on railroads, the engines weighed eight, ten, or twelve tuns each; now they weigh from forty to fifty tuns each. As the locomotives cannot well be made lighter, the only apparent remedy is the employment of steel rails.

Work on the West Shore Hudson river railway is to commence immediately, the contract for building the road as far up as Newburgh—which point can be reached without tunneling—having been awarded some weeks ago. The capital stock of the road is $750,000, a large portion of which has been subscribed.

The Lebanon Springs railroad, connecting the Harlem with the Bennington and Rutland road, it is expected will be completed and in running order in the month of August. The road, when finished, will constitute an important connecting link, so that passengers and freight will go directly through from New York to Montreal without change of cars.

The California Legislature has offered a premium of five dollars per ton for the first thousand tuns of blast or pig iron produced in that State from native ore.

Quite a new feature in the geology of Berlin, Prussia, has lately been developed in the discovery in the immediate neighborhood of the city, of an inexhaustible bed of salt. Government having undertaken to work this deposit, a solid bed, struck at a depth of 277 feet, has proved to be an uninterrupted stratum of five hundred feet thickness. How much deeper it goes is not yet known, but orders have been given to continue the borings until the thickness of the bed is determined. This discovery is of great national importance, for it opens a supply of this article of every-day consumption sufficient to supply all of Prussia, and make the country independent of the imported article.

## Recent American and Foreign Patents.

*Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.*

OYSTER DREDGE.—C. T. Belbin, Baltimore, Md.—This invention relates t the old-fashioned oyster dredge, and consists in a new method of attachin the lower draft rods to the head, whereby the instrument is made to operate to better advantage, while its cost of construction is not increased.

CIDER AND WINE MILL.—James Walton, Sunfish, Ohio.—This invention relates to that class of mills in which an endless apron carrier is employed, and consists in a new arrangement of gear for running the apron, a new adjustable bearing for the grinding rolls, another for the apron rolls, and a new arrangement of hoppers for feeding either apples or grapes.

COMPOSITION FOR DEPILATING HIDES.—Peter G. Schlosser, Middletown, Md.—The object of this invention is to produce a composition by which hides whether green or dry, can be depilated in an easy and expeditious manner, without destroying or injuring the material of the hide, and so as to produce a greater percentage, in weight, of leather, than is possible by any other process.

CARRIER FOR BRAIDING MACHINES.—Dexter Avery, Westfield, Mass.—This invention relates to a carrier for braiding machines, the object of which is to produce the required tension of the threads to protect the spring, which keeps the thread tense, from wear, and to obtain a complete and effective carrier in the simplest and least expensive manner.

VENT FOR BARRELS.—Richard C. Fleming, Philadelphia, Pa.—This invention relates to a device for preserving beer, ale, and other liquids, and consists in a novel manner of inserting in the barrel, and of inflating an expansible bag, which is to be filled with air, and which, as the liquid is being gradually withdrawn, is becoming filled, and fills the vacuum which is created in the barrel by the discharge of the contents.

TAILORS' SEAT.—Friedrich Neuhaus, Belleville, Ill.—This invention relates to a new seat for tailors, which is so arranged that it will allow its occupant to assume a convenient position, and that it will not prevent the proper circulation of the blood.

GAS MACHINE.—H. S. Maxim and John F. Lockwood, New York city.—This invention relates to a new gas-making device, which is more particularly intended for use on railroad cars. The invention chiefly consists in heating the hydrocarbon in the reservoir by a flame produced from the contents of the reservoir, the gas thus produced operating a valve, which, when closed, prevents farther escape of liquid to the flame.

APPARATUS FOR CONVEYING AND DUMPING COAL, ETC.—Henry C. Clark and Robert B. Little, Providence, R. I.—This invention consists in providing the bucket or vehicle in which the coal is transported, with a hinged gate, which, when closed, forms an inclined wall of the vehicle so as to be held

closed by the weight of the contents, and which is provided with an upward projecting lug or pin; when this pin strikes against an obstacle the gate will swing open and the load will be discharged from the vehicle.

HOP BOX.—Wm. R. Crandall, Deansville, N. Y.—The object of this invention is to facilitate the sacking of hops from the hop boxes commonly employed in hop yards during the picking season.

UTERINE SUPPORTER.—S. P. Cole, Janesville, Wis.—This invention consists in forming the pad or point of support for the neck of the uterus of a cup having stretched across its edges a thin diaphragm of soft rubber, which is perforated to permit the escape of discharges. The form of the cup is elliptical, and it is also perforated like the diaphragm.

STUMP EXTRACTOR.—Alfred Goodrich, Burnt Prairie, Ill.—This improvement consists in placing the extracting machinery upon runners and so arranging the said machinery that it shall be easily operated, simple in construction, and capable of developing much power for the purpose intended.

ORE SEPARATOR.—Robert C. Morton, West Lubeck, Me.—The nature of this invention relates to the separation of metallic ores by the pulsation or undulation of water, and consists of a series of plunger levers vibrating above a series of water cells, the plunger levers and cells being arranged to pulsate the water with different degrees of force. Other devices perfecting the whole render this separator more perfect in its action and economical in its construction than the separators heretofore made and used.

HORSESHOE.—James M. Cuykendall, Metoman, Wis.—This invention consists in the manner of securing the calks to the shoe, which is done by securing a wedge-shaped dovetail to the upper surface of the calks, said dovetails fitting into grooves, arranged on the under side of the shoe, which extend entirely across that portion of the shoe which is occupied by the calk.

BOOT CRIMPING MACHINE.—R. H. Dorn, Port Henry, N. Y.—This invention consists in the arrangement upon a suitable bench of a slide, made to move back and forth by a pinion gearing into a rack on the under side of the same, on which rack a series of right-angled formers are carried on its upper side. These formers are caused to pass between two clamping or pressing pins, which are moved in an opposite direction by gearing, in a similar manner, and are provided with smoothing rollers, which bear against that part of the leather which is crimped in the angle of the formers, and turns in a direction so that the surfaces of the said rollers, that come in contact with the leather, move opposite to that in which the leather is being carried by the formers, so as to produce a smoothing or rubbing action. The said clamping pins are provided on the inner sides of the same with iron plates having rectangular grooves in ridges formed within them, and arranged with reference to the formers in a direction opposite to the inclination of the said formers, so that their action on the leather will be to smooth it from the angle outward in either direction.

CATAMENIAL SACK.—Andrew F. Baum, New York city.—This invention relates to an improvement in india-rubber catamenial sacks, and consists in forming the edges by rolling up the material into a solid bead or rib, and then covering it with soluble rubber to make a strong and elastic binding.

THRUST BEARING.—A. W. Case, South Manchester, Conn.—This invention has for its object to furnish an improved turnst bearing for vertical and horizontal shafts, such as water wheel shafts, propeller shafts, etc., which shall be simple in construction, and at the same time reliable and effective in operation, diminishing friction and resisting the thrust of the shaft.

CAR STOVE.—Richard O'Brien, Dalton, Ohio.—This invention has for its object to furnish an improved railroad car stove, which shall be so constructed and arranged that the stove will be always kept in a vertical position, even should the car be overturned, so that there may be no danger of fire from the stove being overturned.

FASTENING FOR GARMENTS.—Wendell Wright, Bloomfield, N. J.—This invention relates to a fastening for shirts, shawls, and other garments, and is more especially designed as a substitute for studs, buttons, shawl pins, etc. The object of the invention is to obtain a secure, economical, and neat fastening of the kind specified, and one which may be readily applied to and detached from the garment, and will not require buttonholes or perforations in the garment in order to apply or use it.

CORN CULTIVATOR.—Alexander Campbell, Oxford, Ind.—This invention relates to a corn cultivator, and it consists in a new manner of attacking the shovel standards to the frame of the machine, whereby any desired pitch may be given the standards as required. The invention also consists in a novel manner of securing the shares to the standards, whereby they may be reversed, that is to say, changed from one standard to another and also adjusted in a straight position so as to face the line of draft or be placed more or less obliquely therewith either to toe right or left, as may be desired.

SPRING FOR VEHICLES.—George Douglas, Bridgeport, Conn.—This invention relates to an improvement in springs for vehicles, and more especially refers to an improvement on a spring for which Letters Patent were granted to this inventor, bearing date May 26, 1863. The present invention consists in dispensing with the usual ribs and slots which are now used to prevent the leaves from shifting laterally, and substituting for said ribs and slots taper longitudinal ribs, swaged in the leaves in such a manner that the under projecting surfaces of the ribs of one leaf will fit into the concave formed by the ribs of the leaf underneath, by which arrangement the lateral and longitudinal shifting of the leaves are entirely prevented. The invention further consists in the application of india-rubber bearings to the cast-metal seat of the spring, whereby jars and concussions are in a great measure prevented from being transmitted from the seat to the spring, and a greater yielding movement or play allowed the latter.

GANG PLOW.—Don Carlos Matteson, Stockton, Cal.—This invention relates to an improvement in gang plows; it consists in a peculiar construction of the same, whereby the difficulty hitherto attending the springing and warping of the frame is avoided. The invention also consists in a novel arrangement of the draft attachment, whereby the same may be placed at a sufficiently low point without carving the frame of the machine downward at its front part as is now required. It consists also in a novel arrangement of the caster gage wheel, whereby the same is prevented from becoming choked or clogged with weeds and trash.

MACHINE FOR BENDING CARRIAGE CIRCLES.—William Boyd, Hartford, N. Y.—The object of this invention is to perform the bending of the iron generally known as carriage circles. It consists of a bending beam pivoted in the center of a bending circle and provided with rollers to impinge on the iron rod and bend it around the circle. Other devices for adjusting the machine to different work render it effective and generally available for bending carriage circles and all other analogous work.

GATE.—Wm. C. Hooker, Abingdon, Ill.—This invention consists in arranging a farm gate between the uprights, a vertically-vibrating frame, whereby the gate is lifted from the roadway and swung in between the posts to which the vibrating frame is connected by suitable rope gearing.

NAIL AND SPIKE DRAWER.—Isaac A. Pinnell, Boonville, Mo.—The object of this invention is to draw nails or spikes in a convenient and easy manner.

CONSTRUCTION OF WHEELS FOR VEHICLES.—Henry Poth, Pittsburgh, Pa.—The nature of this invention relates to the construction of metallic hubs. It consists in forming the hub flanges with correspondent wedge-shaped feathers or projections which, when the plates are wrought together, slide upon each other and form the mortises of the hub and provide the means by which the tenons of the spokes are wedged or clamped firmly in place. It consists also in the employment of a differential threaded box by which the flanges are drawn together upon the spoke tenons with great power.

FILLING FOR BEDS, CUSHIONS, ETC.—George C. Barney, Chicago, Ill.—This invention relates to a new and useful material for filling beds, cushions, and other articles requiring a light, elastic substance for the purpose. This improved filling for beds, mattresses, pillows, cushions, etc., consists in small pieces or scraps of paper cut or otherwise formed in any desired shape and possessing that elastic nature which will keep the pieces apart, when laid together in a mass and inclosed in a bed tick, pillow case, or sack covering of any suitable material for these or similar articles of domestic use.

BRIDLE BIT.—P. J. McGuiness, New York city.—This bit consists of two pieces hinged or pivoted together in the middle, one end of each piece being connected with the reins, while the other end carries a stop, which is near to the end of the other bar, and which, when on the rear side of the other bar, prevents the two bars from turning independently around their pivot, while, when the stop is in front of the other bar, the two bars will be turned when pulled by the reins, and will act as a curb-bit in the horse's mouth.

SEAMING TOOL.—Wm. Serviss, Sidney, Ohio.—This invention relates to a method of constructing tools for grooving the seams of stovepipes, sheet iron stoves, sheet metal conductors, and for all like purposes for which grooving tools are used, whereby the seam is formed more rapidly, and upon the inside instead of the outside, as is now commonly the case.

SAW MILL.—Augustus B. Ehlers, Tannersville, Pa.—This invention relates to an improvement in the construction of machinery for driving a straight saw for sawing lumber, and consists in hanging the saw in connection with an oscillating iguide and slide, in such a manner that the saw shall advance and increase the bite of the teeth in the down stroke, and recede and withdraw the teeth from the log in the up stroke, thereby working with much less power, less wear, greater steadiness, and more rapidity.

TRANSVERSE LOCK.—James E. A. Gibbs, Steel's Tavern, Va.—This invention has for its object to furnish an improved lock provided with two bars or bolts extending out upon each side so as to reach entirely across the door or shutter to be secured, and cross bar it, and which shall, at the same time, be easily operated by the proper key, but impossible to be picked or operated by any other key.

DISTILLING.—Alexander Webster, Seneca Falls, N. Y.—This invention relates to improvements in the process of distilling, and it consists in combining a perforated steam pipe with a perforated cylinder, through which the steam or vapor passes in its course from the still to the coil, and, in connection therewith, a cap by which the lighter and more volatile portion of the vapor is collected, whereby the process is greatly improved, and whereby two qualities of liquor are obtained.

BUTTER WORKER.—Hosea Willard, Vergennes, Vt.—This invention relates to a machine for working butter.

ELECTRO-PLATING FRAME OR HOLDER.—W. H. Watrous, Hartford, Conn.—This invention relates to an implement or frame for holding spoons or forks, or articles of a similar nature, suspended in the electro plating liquid.

FLOATING WATER POWER.—Albert B. Shepard, Sand Bank, N. Y.—This invention relates to a method of constructing apparatus for utilizing and economizing the power of running water upon rivers or streams which are liable to great and sudden changes in depth.

SUSPENDERS.—Wm. P. Towles, Baltimore, Md.—This invention has reference to a method of forming suspenders for gentlemen's pantaloons, whereby the stress or strain is balanced and equalized, and a free and unrestricted motion of the body allowed.

WATER WHEELS.—Joseph H. Bodine, Mount Morris, N. Y.—The object of this invention is to so construct a water wheel, and the parts connected therewith, that the greatest percentage of power may be obtained and the flow of water properly controlled, without employing any complicated or expensive apparatus.

SPARK ARRESTER.—N. L. Carpenter, Natchez, Miss.—This invention relates to a method of arresting sparks from steam-engine boiler furnaces, either locomotive or stationary, and the invention consists in sinking vertical wells or recesses in the brick or mason work beneath the boiler.

## Answers to Correspondents.

*CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.*

*SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1 00 a line, under the head of "Business and Personal."*

☞ *All reference to back numbers should be by volume and page.*

J. P. G., of Vt.—Steel is successfully alloyed with other metals, improving its qualities for some purposes. One five hundredth part of silver adds immensely to the hardness of steel and yet increases its tenacity. One hundredth part of platinum, though not forming so hard an alloy as the silver and steel, gives a very great degree of toughness. Rhodium, palladium, irridium, and osmium make steel very hard, but their use, from their cost, is confined mainly to the experimental laboratory.

P. J., of Wis.—Practical men disagree as to the best time to fell timber to preserve it longest from decay; but as moisture, especially sap, is the first cause of the decay of wood, it would seem that the season is best for felling timber which produces the least sap. Therefore probably the hight of summer and the middle of winter are the best periods for cutting timber. Girdling trees in early spring and felling them in the fall or winter is recommended by many as an excellent method.

C. B., of Iowa.—"How many square feet of sail or fan set at the best angle will it take to develope one horse power in a twenty-mile breeze? What is the best angle with the course of the wind to set a sail to develope the most power? Will distance from the center of rotation make any difference in the actual force per square foot?" This correspondent, in asking these questions, says he has searched in vain in many mechanical works for authority on this subject. It is one that appears to have received but little attention at the hands of our mechanical writers. We know of no authority we can recommend. Possibly some of our practical correspondents can reply.

A. B., of N. Y., says: "In your 'Answers,' page 327 current volume, you say, the cause of the appearance of solidity so strikingly exhibited by the stereoscope is to a certain degree shown by a single photograph, etc. Would it not be well to say that it is mostly due to double vision, or a repetition of sight, as we see nature with two eyes, whereas all other pictures are but representations of nature as seen with one eye, only. The two pictures of a stereoscopic view are the one picture as seen with the right eye and the other as seen with the left eye. The lenses through which the pictures are seen in a stereoscope represent the two pictures as being on the same spot, therefore we see nature as it appears in our double vision of two eyes, or as seen from two points simultaneously."

A. W., of Ind.—"Will it require more power to revolve a circular metallic disk in a vessel (air tight) containing highly compressed air, than in one containing air at the ordinary conditions found in the atmosphere?" Certainly. Compressed air presents more resistance to motion than free air.

F. W. D., of Ky.—A cement peculiarly adapted to stand petroleum or any of its distillates is made by boiling three parts of resin with one of caustic soda and five of water. This forms a resin soap which is afterward mixed with half its weight of plaster of Paris, zinc white, white lead, or precipitated chalk. The plaster hardens in about forty minutes.

B. H. K., of Pa.—Liquid glass would probably not answer your purpose for a cement, but the so-called artificial denture of the dentists may. It is made by thoroughly mixing nine parts calcined oxide of lime, one part borax, and two parts of well-ground quartz; this is mixed with a saturated solution of zinc in hydrochloric acid. It sets very rapidly.

H. H. H., of Pa.—Shellac makes a very good cement to attach glass to metal, but both must be heated or it will not stick. If too brittle, mix a little wax in it. It stands warm water, acids, petroleum, but neither alcohol nor heat.

J. N., of R. I.—Steam is not decomposed by heat even at fifty atmospheres pressure. At 1,000° Fah., it will be decomposed in contact with iron, the iron oxidizing and the hydrogen being set free; only at a very high temperature, at least 3,000°, it is supposed to separate in free oxygen and hydrogen.

A. B., of Mass.—The frosted appearance of sheet tin and galvanized iron is given by a wash of bichloride of tin.

D. T., of Mass.—Prussian blue is no compound of the oxide of iron nor does it contain oxygen. It is not found as a mineral, nor is it a chemical product obtained from minerals. Notwithstanding its containing iron, it is altogether an organic substance, and exclusively prepared from old leather, blood or animal matter of any kind, fused at a red heat, with caustic potash in an iron vessel, the carbon and nitrogen of the animal substance combining with cyanogen and this with the potash to cyanide of potassium. The presence of iron changes it into the ferrocyanide, and a solution of this salt brought in contact with a solution of certain salts of iron forms different shades of blue precipitates, of which Prussian blue is the richest in color. Its formula is

$$C_{18}\ N_9\ Fe_7$$

F. W. P., of Ky.—A camera obscura for tracing pictures with a pencil is best made by placing a convex spectacle glass of some two or three feet focal distance on the top of a dark conical box at that hight, and above this a piece of looking glass inclined at an angle of about 45°; the box is placed on a table and the paper placed on its bottom; one hole is made in the side of the box to pass the hand in, and another to look through at its bottom.

## Business and Personal.

*The charge for insertion under this head is one dollar a line.*

A master mechanic writes:—"I look upon Olmsted's improved oiler as a perfect article, and consider it the best and most durable oiler made." Sold everywhere.

A. C. N. Schulze, Bellville, Austin Co., Texas, wants a first-class machine for making brooms from broom corn, also, one for removing the seeds from the corn, and one for rounding the sawed handles. Send description and price.

The book on the watch can be obtained complete, neatly bound, of the author, H. F. Piaget, 119 Fulton st. Sent by mail for 60 cents.

N. B.—Most manufacturers of first-class steam engines are using Broughton's lubricators and oil cups. They cannot leak nor waste oil, and are in every respect the best in use. Send to Broughton & Moore, 41 Center st., for circulars.

For sale cheap—Bedell's patent adjustable heel trimmer. Inquire of John Charlton, No. 9 Gold st., New York.

I want a partner to work an invention for perfectly non-explosive boilers. No tubes or globes; of wrought iron, light and portable, and good circulation of water. Address W. Bye, Western House, Broadway, St. Louis, Mo.

We understand that the "Star Shuttle Sewing Machine Co." are manufacturing one hundred of their celebrated machines per day, at their works in Cleveland, Ohio.

To patentees and others.—Brass, tin, and iron small wares of all description made to order. Dies and tools made for metal cutting, stamping, spinning, and drawing. Tools on hand for the manufacture of kerosene burners, stationers' hardware, oilers, toys, etc., etc. J. H. White, Newark, N. J.

Wanted—the address of manufacturers of brass and malleable iron castings who have facilities for manufacturing small articles. Address Bisbee & Hearn, Yreka, California.

Universal filter well.—Drives and works successfully in every variety of soil. Patented in Dec., 1867, by Oscar C. Fox, Georgetown, D. C.

Rare chance for limited capital.—State or the entire right for sale of the "weighing and measuring cup," and the "combination funnel," six distinct uses. Two of the best patents out. Address Goodes & Co., 638 Franklin st., Philadelphia, Pa.

Prang's American chromos for sale at all respectable art stores. Catalogues mailed free by L. Prang & Co., Boston.

For breech-loading shot guns, address C. Parker, Meriden, Ct.

For sale—Road or State rights to make and use Blythe & Hayes' patent machine for turning off locomotive crank pins in the wheel. Address W. Blythe and N. Hayes, Alexandria, Va.

The surest detective of low and high water, and high steam in boilers yet invented. Springer, Hess & Co., Philadelphia, Pa.

Winans' Boiler Powder (11 Wall st., N. Y.) A positively uninjurious remedy for incrustations, 12 years' references. Beware of frauds.

## EXTENSION NOTICES.

Clark Alvord, of Courtland, Wis., having petitioned for the extension of a patent granted to him the 21st day of November, 1854, for an improvement in hand brick molds, for seven years from the expiration of said patent, which takes place on the 21st day of November, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 26th day of October next.

Horace W. Peaslee, of Malden Bridge, N. Y., having petitioned for the extension of a patent granted to him the 23d day of January, 1855, antedated September 24, 1854, reissued January 8, 1856, and again reissued March 19, 1867, for an improvement in machines for washing paper stock, for seven years from the expiration of said patent, which takes place on the 24th day of September, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 31st day of August next.

## NEW PUBLICATIONS.

COWDIN'S REPORT TO THE STATE DEPARTMENT.

We have before us the official report of Elliot C. Cowdin, United States Commissioner to the Paris Exposition. The subject is silk and silk manufactures, and it embodies, beside a succinct history of the rise and progress of the silk culture, a large amount of useful information to the silk grower and manufacturer of to-day. The subject is one which is of growing importance to the interests of this country, parts of which are excellently well adapted to this manufacture. We shall take occasion hereafter to quote from Mr. Cowdin's report.

AMERICAN ANNUAL CYCLOPEDIA FOR 1867. Vol. XII.

From the publishers, D. Appleton & Co. 90 Grand street, New York city, we have received the Annual Cyclopedia for 1867, a compendium of important events for that year, embracing every department of the sciences, arts, politics, biography, literature, geography, etc. This volume is embellished with fine steel portraits of Peabody, Burlingame, and Chase, and an engraving of the Paris Exposition building. Among the hundreds of other subjects of interest reported is Abyssinia, illustrated by a map. The value of these annuals can hardly be overestimated. The facts collated, which before could be gathered only from periodicals, are arranged and embodied in a succinct form, available for reference and equally valuable to the student and the general reader. The paper and printing are of the first quality, and the volume in its make up, as well as its contents, is creditable to the publishers.

THE CARPENTER AND JOINER, and Elements of Hand-railing; thirty-two plates. By Robert Riddell. Philadelphia: Claxton, Remsen & Haffelfinger, 819 Market street.

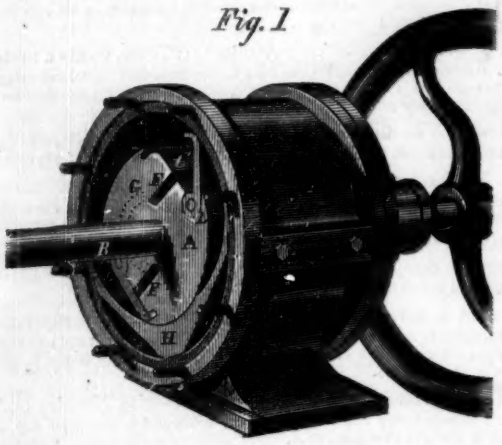
The name of the author of this treatise is a sufficient guaranty of its value. The text is mainly a description of the plates, and is remarkably clear and explicit. The book seems to be well adapted to the use of the apprentice and beginner, and also valuable to the master workman. The principles of stair building—that most difficult art to acquire—appear to be so plainly explained and illustrated that the student can hardly fail to master them by the aid of this treatise.

## TURNER'S ROTARY STEAM ENGINE.

Judging from the statements of the inventor and patentee of the engine illustrated in the accompanying engravings and an examination of his claims and model, it would seem that he has succeeded in improving upon other rotaries, in diminishing friction and using his steam to the greatest advantage and with the least possible waste. He is the publisher of the Grand Rapids (Mich.,) *Daily Eagle*, and he says: "We are running one of these engines in our press room and it works admirably. This engine is twelve inches diameter and eight inches between heads; it has a steam opening one and a half inches wide, and drives, with sixty revolutions, two Hoe cylinder presses and a Gordon Franklin with ease."

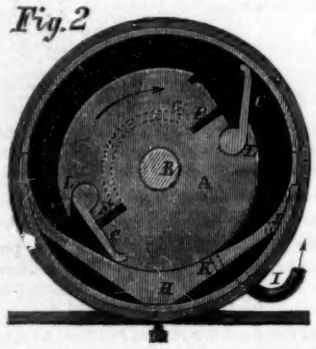
The engine with one head removed is seen in perspective in Fig. 1. It has a light balance wheel attached, which, however, it is not believed is absolutely necessary, as a regular and even rotation is kept up without it. The figures 2 and 3 present transverse and longitudinal sections of the machine. In the description the same letters refer to similar parts.

*Fig. 1*



Inside the cylinder is a cylindrical piston, A, secured to the shaft, B, its ends fitting closely the inside of the cylinder heads. In the periphery of this revolving piston are hinged or pivoted wing valves or arms, C, which when closed form a portion of the periphery of the piston, and when opened impinge against the inner surface of the cylinder. Steam is admitted at the point, D, Fig. 3, to a chamber in one of the heads, shown by the parallel curved dotted lines in Figs. 1 and 2 and the opening, E, in Fig. 3. This steam chamber, being always filled with steam, supplies the annular space between the outside of the revolving piston and the inside of

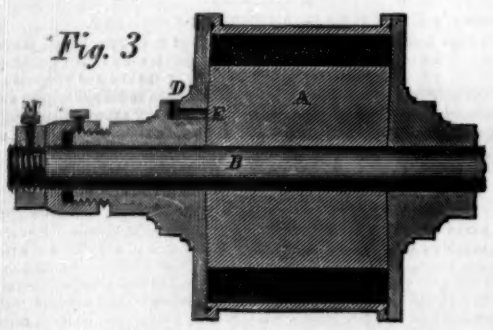
*Fig. 2*



the cylinder, and passes under the wing valves through the passages, F, in the piston, which extend across its length. The steam thus admitted acts on the valves and is cut off at G, which cut-off may be increased to any desired extent by filling a portion of the steam chamber in the head between G and the induction pipe.

The double cam block, H, to save weight and material, is made hollow, leaving spaces between it and the inside of the cylinder. From one of these spaces the exhaust pipe, I, carries off the steam which is received from the steam space at

*Fig. 3*

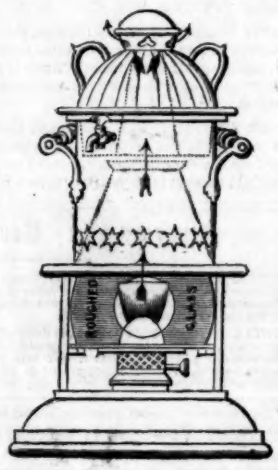


two points (Fig. 2), J and K, the first being a small opening to relieve the pressure upon the valve in closing, thus preventing any clicking noise and any unnecessary wear of the valve; the exhaust through the main opening, K, not taking place until the valve is entirely shut to place. As the acting steam passes under and acts upon the valve at the precise point at which it begins to open, it keeps out the point of the valve so as to follow the elliptical surface of the cam until it finds its proper bearing on the shoulder, L, at the same time the point of the valve forming a steam tight joint on the inside of the cylinder. As the steam has not exhausted in front of the valve until it finds its proper bearing, very little friction is produced by the opening of the valve. The direction of motion of the engine is shown by the arrow in Fig. 2. In Fig. 3 is seen a collar, M, screwed on the end of the shaft to prevent the pressure of the steam, which is admitted at that end, from forcing the piston against the opposite end of the cylinder. This collar forms a joint with the stuffing box.

From the foregoing, together with the examination of the engravings, the engineer or mechanic will readily understand the operation of the engine. Further information may be obtained by addressing Turner & Company, Publishers *Daily Eagle*, Grand Rapids, Mich.

## ORNAMENTAL PETROLEUM STOVE.

Though we have freely expressed our disapproval of chimneyless stoves in general, we must admit that the essential defect of such heat generators is almost inappreciable in the portable petroleum stoves which Messrs. James Hinks and Son are now manufacturing under letters patent. Wherever an ordinary petroleum lamp can be kept burning without inconvenience, one of these stoves may be safely used, for the source of heat is simply a petroleum flame from a flat one-inch burner. As the fuel is hydrocarbon, free from sulphur, no offensive and corrosive sulphur compounds are produced by its combustion. Moreover, the bright, white heat of the flame insures the full oxidation of the carbon, and prevents the formation of that lower poisonous oxide which is produced by the slow combustion of coke and charcoal. According to theory, therefore, petroleum is better adapted as a fuel for portable stoves than either coal gas or solid carbon, and we do not fear a conflict between experience and theory. Our own experience, as far as it goes, justifies us in recommending this new petroleum stove as an effective and inoffensive source of heat in halls, shops, warehouses, conservatories, ships' cabins, etc. For warming small conservatories they are admirably adapted, as the flame of petroleum produces what is called a "moist heat"; in other words, a large amount of aqueous vapor results from the combustion of the hydrogen contained in the hydrocarbon. The annexed engraving represents a stove in which the portion surrounding the flame is formed of ground glass, in order that the stove may be at once a source of light and heat. The base of the stove is the reservoir for the petroleum, and is capable of holding three




pints, or sufficient for a week's average consumption. Upon this is fitted a flat one-inch burner, above which rises a cone of metal, communicating with a conical chimney. The draft produced by this arrangement obviates the necessity of employing a glass chimney, which would, of course, intercept a considerable amount of heat. The outer case of the stove, which is made of planished copper, is provided with handles, by which it may be lifted, and a small oval window, through which the flame may be seen. On the top of the outer case is fitted an ornamental hot-water reservoir, or boiler, capable of holding three pints, and provided with a draw-off tap. The heat, passing through the centre of this reservoir, maintains the water at the boiling temperature, and the steam escapes with the heated air, by openings in the spherical ornament covering the chimney. The hight of the stove is twenty inches; its diameter six and a half inches.—*Ironmonger.*

## Formation of Dendrites.

Dr. Emerson Reynolds read a paper before the Royal Geological Society of Ireland on the formation of dendrites. He had some years since noticed that, when solutions of salts were placed upon a plate of clean glass, and the glass placed between the poles of a Ruhmkorff coil, the salts gradually worked over the surface of the glass in beautiful moss-like forms, which in many cases were characteristic of the compound contained in solution; the state of dilution at the same time, having some considerable influence. The author proposed to call these "electric cohesion figures." To produce them we will say that a drop of a solution of cyanide of potassium is put in the center of a plate of glass, which is then placed upon a sheet of tin foil. One pole of the coil (it is immaterial which) is then brought into contact with the foil and the other pole is placed in the center of the drop; immediately on passing the current the solution begins to creep over the surface of the glass in moss-like convolutions.

The dendritic markings on minerals the author believed were formed under a similar condition. He exhibited a beautiful manganeseous dendrite taken out of the museum. It was a conchoidal limestone slab, and in Dr. Reynold's opinion illustrated his electrical explanation conclusively. There was originally a flaw in the limestone which was exactly at right angles with the plain of cleavage. Through these flaws, as was evident by the marks, the manganeseous solution had percolated, and had perhaps ultimately been the means of making the stone part in two, not however in the direction of the flaws, but in the plain of cleavage. The dendrites which were formed upon the surface in this case were produced from the well-known fact that two surfaces at the instant of their separation are in opposite electrical conditions.

This phenomenon may be illustrated to a certain extent by inserting a drop of the fluid into the interstice of a plate of mica, and then on suddenly parting the plate the dentritic forms are shown. To fix them the author dusts some finely dried pigment over the surface of the still moist plate, and then fixes this by some transparent varnish.

## Ascendency of Machinery over the Power of Sinew and Muscle.

Our age is characterized by the grandest development of mechanical power ever known in the history of the human race. The machine power of England and Wales is competent to perform the labor of nearly six hundred millions of men; and is probably greater in productive capacity than the labor power of all the world besides. The machine power of the United States, through growing with amazing rapidity, does not more than equal the labor power of two hundred millions of men. It is owned, of course, almost exclusively by the North.

This mechanical power, wherever developed and wherever possessed, is placing the communities employing it far in advance of others in wealth, population, and political and financial power. This form of industrial energy began to take growth in England about one century ago, when that country was yet almost exclusively agricultural; when it exported largely of grain, and imported largely of manufactures; when its industrial interests were all in a languishing condition; and when, consequently, it was too feeble to suppress a "rebellion" represented by fifteen or twenty thousand soldiers under the command of George Washington. Abundant statistics are available to show that the agricultural communities of England have advanced since that time very slowly and inconsiderably, except so far as they have been stimulated by the presence of manufactures; and that the wonderful development of the island in the intervening period has occurred exclusively in its mining and manufacturing population. So vast is the present capacity of Great Britain for protection and for the execution of labor, that it can underbid the whole world in the sale of merchandize; and even the enterprizing and boastful Northern States of America, notwithstanding the aid derived from the highest tariff ever enforced, are about to experience a financial collapse, in consequence of an excess of imports over exports in their foreign trade; an excess amounting to several hundred millions of dollars per annum. So completely does this tremendous machinery power secure to Great Britain the command of trade and the tribute of the world, that other countries will have to reverse their previously received axioms of political economy, in order to protect their industrial interests from the crushing competition of so colossal a power.—*Hunt's Merchants' Magazine.*

## THE "OSCILLATING OR VARIABLE ECCENTRIC MOTION."

This invention is designed to further develope the great mechanical lever called the eccentric, and adapt it to a greater field of usefulness by attaching oscillation to it, thus making it, as it were, flexible, still rigid, but at the same time allowing the eccentric rod to oscillate, swing, or vary from the eccentric, in its true line of motion.

*Fig. 1*

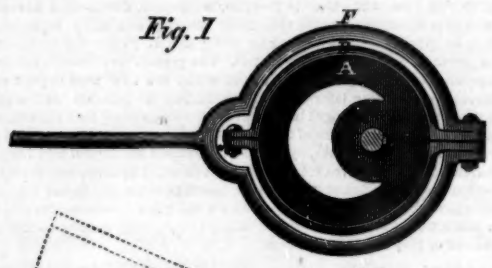
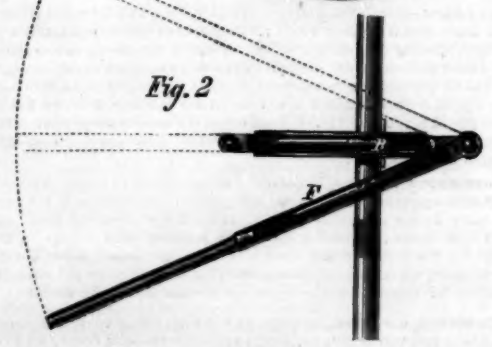


*Fig. 2*



By reference to the accompanying engravings, Figs. 1 and 2, it will be seen that by the attachment of the exterior band, F, in the manner shown, the eccentric rod has perfect freedom to swing, while the eccentric block, A, is keyed firmly to the shaft, and revolves in its true line of motion. Also, by this arrangement, the eccentric rod may be set, if required, at almost any angle to the line of eccentric motion, and still work freely. By this means, marble, wood, etc., may be sawed or cut, of a tapering or angular form, without changing or moving the body being cut; or angular or irregular grooves in iron, etc., may be cut or planed with facility. Also, by this arrangement, two or more eccentric rods, B, may be attached to the same eccentric, for driving two or more pumps, or independent lathes, etc. In fact, this invention is applicable to a great variety of purposes and uses, too numerous to mention.

The device herewith illustrated was patented through the Scientific American Agency, by Timothy Keeler and Geo. S. Avery, of Danbury, Conn., April 28, 1868. All communications regarding it should be addressed to Keeler & Avery, Danbury, Conn

# Scientific American.

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VOL. XVIII., No. 25....[NEW SERIES].. *Twenty-third Year.*

NEW YORK, SATURDAY, JUNE 20, 1868.


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## UNIFORMITY.

The only thing in nature or art that can be said to be perfectly uniform is the action of the physical laws which underlie and maintain the universe. Yet the results of these laws, the phenomena of nature, are endlessly various, and scarcely any two of her productions are exactly similar. A comparison between two plants, or animals, or minerals, of the same kind, always shows some point of difference. Even chemical elements, which if really elements cannot exhibit characters dependent upon combination, are found to vary in their color, the form of their crystals, etc., when different specimens of the same element are contrasted.

Why is it that invariable laws admit of variable results? The answer is that although any one of nature's laws acting alone would produce perfectly uniform results, that when they act in concert the effect produced is a resultant, and varies according to the accordant or discordant action of these laws. In fact, these laws may be so exactly and equally antagonistic that their resultant is nothing.

As in nature so in art that deals with her productions. The variable nature of the materials which are used in the arts, variations in size caused by variations in temperature, variations in appearance caused by optical phenomena, variations in judgment caused by differences in the power of sensation at different times, and variations in measurements which are the result of the above mentioned variations, all conspire to impede uniform production.

It is a well known fact that violins made by celebrated makers after the same model, and in each of which perfection was aimed at, differ widely from each other in power and quality of tone.

Chronometers have their individual characteristics also. Though they may be as uniformly made as human skill will permit, they will vary more or less from the true sidereal time. A knowledge of the ratio in which one of these instruments "gains or loses" is essential to its use in navigation.

It were an easy task to enumerate instance upon instance to show the utter impossibility of entire uniformity in production, although in many cases very close approximations to it have been made. Nature seems to disapprove of individual likeness, and this tendency to specific differences in individuals has been considered by Darwin and others to be sufficient to account for the origin of species.

By a selection of pigeons having certain peculiarities, and again selecting from their progeny such as had the same features as strongly marked as possible, Darwin obtained birds from the pigeon stock which had hooked beaks, talons like hawks, and that fed upon meat. In fact, so far as general appearance and habits are concerned, they were hawks.

The necessity of obtaining an approximate uniformity in the productions of the arts, and the impossibility of obtaining uniform materials and operating them under similar circumstances, are reasons why skill and experience are essential to success.

Could perfect uniformity in nature be depended upon, every thing might be reduced to formula, and exact results be relied upon. Chemical manufacture would become the easiest of conceivable occupations. No need then to take into account specific gravity, or to watch the thermometer. The photographer would no longer complain of failures depending upon the character of his materials; the child of ten would compound as good bread as the experienced matron of forty. In short, we should all be on a level, and a monotony would pervade the entire range of production. The word excellence would become obsolete, and ambition, the stimulus to all great enterprises, would share the same fate. There is as much truth and philosophy as poetry in the couplet

"Variety 's the spice of life,
That gives it all its savor."

## WHY A LONG SCREWDRIVER IMPELS A SCREW MORE EASILY THAN A SHORT ONE.

In most cases, where there is an apparent conflict between theory and fact, people, who are not familiar with the facts involved, are too much inclined to give undue weight to theory, and too little credit to evidence which goes to support the facts. In such cases, however, it is well to be cautious in forming opinions, because it often happens that some point in theory has escaped notice and has led to wrong inferences and conclusions.

Perhaps nothing illustrates better the importance of giving attention to the opinions of practical men, in matters upon which they have a knowledge based upon experience, than the difference of opinion which is common upon the question, whether a long screwdriver impels a screw with more ease than a short one. A mechanic accustomed to the use of this implement will almost always answer the question in the affirmative; while a man whose knowledge of mechanical subjects is merely theoretical, generally conceives it to be impossible. For ourselves, we are assured that the opinions of mechanics upon this point are correct, and we obtained the assurance by means of a series of experiments, which not only convinced us of the truth of the statement, but also satisfactorily explained the phenomenon.

We experimented in the following manner:—We selected a piece of very thoroughly seasoned cherry timber: a portion of a frame of some old machine which had been lying in the shop for a very long time, and after having selected the screws to be used in the experiment, we drilled holes in the timber of a suitable size, and, by means of a reamer, gave them a very gradual taper. The screws selected were 4-inch, gimlet points, with very strong heads, and about ⅛ of an inch diameter. The screwdrivers compared were, respectively, 8 inches and 20 inches in length, including the handle. The holes were tapered so that it would be impossible to drive the screws home, and were made as nearly of uniform size as possible. The wood was very homogeneous, and the screws were calipered to ascertain and obtain those of uniform size. Eight holes were prepared, and the eight screws selected, oiled, and laid in order. The screws were put in alternately by the long and the short screwdriver, and driven as far as strength would permit in each case. The result was a pretty uniform variation. Nos. 2, 4, 6, and 8, which were driven by the short screwdriver standing about ¼ of an inch higher than the rest. Applying the long screwdriver to these screws they were driven down to a pretty uniform level with the others. With the short screwdriver it was found impossible to start back any of the screws, but with the long one, we were enabled to take them all out.

Being thus satisfied that the long screwdriver had the more power in impelling the screw, we set ourselves to discover in what the secret of advantage consisted, and were enabled by a repetition of the experiment above described, but with slightly varied conditions, to refer it to the principle of the lever. If both screw drivers be held in such a position that the axis of each shall form a continuous line with the axis of the screw to be impelled, no advantage in favor of either will be discovered. But the long screwdriver admits of considerable play from side to side without releasing the screw, while the short one admits of very little. It is easy to verify this by the application of screwdrivers of different lengths to screw heads. In the effort to put in a screw where much exertion is necessary, this play and the consequent purchase are always obtained.

To prove such to be the facts, we arranged a guide or rest over the holes prepared for the reception of the screws so that by placing a suitable adjustment upon the blades of the screwdrivers we kept them in line with the axis of each screw. In this experiment no variation which could be attributed to the screwdrivers was apparent.

Repeating the experiment, a third time with the short screwdriver ground so as to incline it out of line, about as much as the estimated inclination of the longer one without causing it to lose its hold, we found, if any variation existed at all, it was in favor of the short one.

Undoubtedly, however, something in favor of long screwdrivers must be attributed to the fact, that they have larger handles than short ones, and thus present a greater leverage to the action of the hand.

Thus it is seen how statements apparently incongruous, may, by proper examination, often be proved to be in accordance with sound science.

## GRINDSTONES—THEIR ACTUAL AND POSSIBLE USES.

The grindstone is of so ancient and common use that for the one the "memory of man runneth not to the contrary," and for the other its employment is already considered circumscribed. Yet the grindstone is capable of doing a much larger share of the work in the manufactory and machine shop than is usually accorded to it. On the farm its sole use is the sharpening of implements, from the carving knife down to the hoe and plowshare, but in the shop it is employed for grading the surfaces of metals—cast and wrought iron, steel, and some other of the obdurate metals. It is used either dry or wet, revolving swiftly or slowly.

Stones for grinding purposes are found in England, Scotland, Sweden, France, Nova Scotia, Ohio, and Michigan. Most of those, however, used in the East are from Nova Scotio and Ohio. From a practice of many years we prefer those of Nova Scotia to the Ohio stones because of their more even composition and genial grit. We are told, however, by one of the first saw manufacturers in the country that the artificial stones made by the Ransome process in Trenton, N. J., are superior to either in homogeneousness of texture and good grit. He uses them in preference to the others, although their first cost is somewhat greater.

One great trouble with the natural stones is the presence of spiculae, of hard, flinty substances standing out toward the circumference and resisting every legitimate effort for their removal. When a stone is found to contain these spikes of flint or obsidian the cheapest way is to discard it—roll it out of the shop,—for so long as it remains it will be a perpetual torment. Chipping off the obdurate spike, by the cold chisel is only a temporary expedient, as it will be sure to show itself again. A stone containing these hard spots is not fit for use in the shop; it will prevent any good work and be a permanent annoyance.

Much of the time and the cost of tools spent on the dressing, and even finishing of castings and forgings, which are now expended at the vice and by the use of cold chisel and file might be saved by a judicious use of the grindstone. It is singular that this ready means of abrading surfaces of metals and preparing them for after processes should occupy the very lowest place among the tools of a shop. Yet it is the fact that the grindstone, even when used only to give an edge to tools, is the worst kept appliance. The reason, we believe, is that its capabilities and possible uses are unknown. Why it should be so we are at a loss to conjecture. It may be made capable of saving much time now employed by skilled and costly labor and much waste of files and similar expensive tools. Many jobs generally submitted to the slow action of the planer might, by the more rapid action of the grindstone, be fitted for the after processes of the filer's art, with just as perfect satisfaction in the finished work.

## TO ADVERTISING CORRESPONDENTS.—AXES TO GRIND.

We receive daily a great amount of very voluminous correspondence, upon subjects of great importance in the eye of the writer, but of no interest whatsoever to the readers of the SCIENTIFIC AMERICAN, and such articles are, of course, cast into the waste basket. In many cases, however, the subjects are important enough, but the writers have such a roundabout style that several pages are written in order to convey ideas that could easily be expressed in half a page, or even in a few lines. Correspondents should keep in view that the space in a journal of the circulation of this one is very valuable, and that the chance of having articles published is considerably increased by condensing them as much as possible.

We commend to the consideration of such correspondents the advice given by the editor of the London *Times* to a correspondent, who furnished him a very verbose article on an interesting subject. Said the editor, "You must reduce this one half." He did so, and reappeared with the article. "Reduce it one half," said the editor again. The abridgment was made, but not yet proving entirely satisfactory, a third condensation was ordered, when, in the editorial judgment the article had assumed reasonable shape, and shorn of every thing non-important to the subject, and in this condition made its appearance.

Often the whole purpose of the article, although sometimes ingeniously sugar-coated, is to recommend something the writer manufactures, or vends. To such correspondents we respectfully suggest that we are seldom deceived, and they are usually referred to our advertising columns to offer their wares. A Dr. Chase, of Ohio, for instance, sent us a long article on the non-explosiveness of all hydrocarbon oils, provided a certain kind of lamp burner was used, in which he has, no doubt, an interest, as also probably in making the combustible fluid, and offers to subscribe for our paper when we insert it. Now the extent of his article—entirely written in promotion of his private interests—is such, that at our regular published rates one insertion would cost $150; this will explain to him one reason for refusing to publish his communication, the other being that we by no means can endorse his assertion that the government test of kerosene oil is all nonsense; that only the lamp should be tested, and that gasoline, benzine, and other combustibles, are just as safe as kerosene. He should keep in view that the cause of the kerosene explosions is not the deficiency of the government inspection, but the adulteration of pure kerosene oil with cheaper benzine, made by men of his stamp, who have some new kind of lamp or oil for sale.

## THE COOPER UNION IN NEW YORK.

During the last three days of May, this institution was in a blaze of glory, the occasion being the so-called yearly reception of the pupils, which, however, is nothing more than an exhibition of the work of the classes for drawing, painting, and sculpture. The exhibition was indeed very creditable, and it is doubtful if anywhere in the world a similar institution exists where several hundred pupils, receiving gratuitous instruction, at the end of the winter session are able to exhibit not only so many specimens of their industry, but so large a number of creditable productions, evincing a high degree of application and intelligence on the part of the pupils, as well as good thorough instruction on that of the teachers.

The department of mechanical and architectural drawing did not show any thing particularly noticeable above former years; but in that of free hand drawing, a decided progress was apparent. There were not so many copies of those familiar drawing-class lithographs, of which we have seen too much in former years. It must not be forgotten that copying a drawing is no art, in the higher sense of the word. True art is only attained by drawing from natural, or, at least, material objects; it is the only road to artistic power, and it was in this specialty that in former years the ladies' classes in the Cooper Union were far ahead of those for the young men. That this state of affairs existed, was the fault of the system of instruction, and the professors of male department appear to have at last waked up to its realization, as the exhi

bition of a great number of drawings from nature very creditably testify.

The modeling in the female department was so admirable as to astonish those able to appreciate this most difficult and most charming of artistic efforts. In painting, also, there were among the pictures some more worthy to be exhibited at our Academy than certain more pretentious specimens of so-called professional artists now on exhibition on its walls.

We, of course, fully appreciate the great importance of drawing to the mechanic and artisan, but we fear that the scientific department of the Cooper Union does not keep pace with the artistic. If the institute were conceived solely for a school of design and cognate branches for male and female pupils, it could be said that it is fully on the road to ultimate perfection; but it was founded "for the advancement of science and art," and the time and accommodation devoted to art far outstrip those devoted to science; this will become evident by the following statement, which at the same time will give our readers at a distance some idea of the extent of the building.

The fourth floor contains two lecture rooms, each about sixty feet square; a mineralogical cabinet, laboratory and apparatus room, each sixty by twenty feet; six or eight class rooms for mathematics, and rooms for the professor of natural sciences. On this one floor are taught the evening classes in mathematics, mechanics, natural philosophy, chemistry, elocution and music. The entire fifth story is devoted to the evening drawing classes for young men. The school of design for women occupies the whole third floor during the day, and the third floor contains the free reading room and library.

We must, however, in order to be just, remark that the scientific course requires more preparation than the artistic. A person may successfully follow a course of instruction in drawing, even if he is deficient in the common branches of education, though he cannot, of course, ever become a real artist, as for this a cultivated and well-trained mind is required. In the scientific course, however, a person deficient in arithmetic, for instance, can proceed slowly, if at all. This remark is verified by the statement of the secretary of the institute on the night of graduation, that of 1,200 pupils inscribed on the rolls, only about one third were able to continue the course, two thirds being deficient chiefly in arithmetic, and thus not prepared to follow the mathematical course, which, we are happy to say, is in this institution made the base of all further scientific instruction.

The aim of this institute is to give gratuitously a technical education to all, the instruction beginning at that point where the highest branches of the common school education ends. Several hundreds have availed themselves of the advantages the institute so liberally offers during the nine years of its existence, and thousands more may reap its benefits, as the institute is self supporting. The institute, as our readers must all know, was a free gift of Mr. Peter Cooper to the city. The original cost was about $700,000, while its actual value, according to the present valuation of real estate in that locality, is now one and a half million of dollars.

## NEW ENGRAVING LATHE.

A very ingenious and effective lathe for engraving upon copper, steel, wood, and other substances is now in operation at 207 Pearl street, New York city, which is worthy the attention of all who are interested in the reproduction of art. The machine is the invention of Messrs. Guerrant and Field, of North Carolina, who have come North seeking for the necessary business talent and pecuniary aid to put their invention into extensive use. To engrave by means of this machine the operator sits with a copy of the drawing, photograph, or whatever design is to be engraved, directly in front of him. A small pointer rests upon the drawing, and the whole operation consists in moving the pointer over the several lines of the copy. The pointer is operated by two small cranks, one of which produces a vertical and the other a lateral movement; the simultaneous operation of both cranks producing a circular, inclined, or any desired irregular motion of the pointer, which is thus made to "follow copy." All the movements of the pointer are imparted by means of a very simple arrangement of levers to a graver which cuts or engraves the design upon the surface of a copper plate or block. Thus in a rapid manner even an unskilled person having a drawing before him, may engrave the same in superior style. The swelled lines as well as hair lines of copper plate writing may be produced with the utmost freedom, and there seems to be no limit to the execution of the finest and most difficult as well as the simplest kinds of work. It makes no difference whether the surface to be engraved is flat, circular, or irregular. We have seen the whole of the Lord's Prayer engraved by this machine upon the interior of an ordinary finger ring, every letter being perfectly formed and legible under a magnifying glass, but too small to be read by the unassisted eye. For jewelry work, the ornamentation of metals, the production of copper, steel, and wood engravings for letter press, and many other purposes, this invention seems to be well adapted.

## MAGNIFIED PHOTOGRAPHIC PICTURES.

If it were possible to take a photograph, say of the moon, and then to take a second one of a portion of the first, and of the same size as the first, and to repeat the process as often as required, a picture might at last be obtained that would show the minute details in the structure of that body; and in the same way the minutest details in the structure of other bodies, now beyond the reach of the most powerful microscopes, might be shown and examined at leisure. In the present state of science it is not possible to accomplish this, for several reasons.

First, the photographic picture is painted by the deposit of metallic silver, which, in a minute state of subdivision, gives a general gray tone to the picture when it is not magnified; but when the entire picture, or a small portion of it, is inspected by means of lenses, the white luster of the silver appears more and more plainly as lenses of higher power are used, and the picture assumes a frosted and crystalline appearance, which obscures the finer details beyond a certain limit. The limit is reached by a lens of quite low power, and photographic pictures when viewed in stereoscopes show more or less of the silvery frosted-looking surface texture. To obviate this difficulty a substance must be discovered as sensitive to light as the salts of silver now in general use for photographic purposes, and that will in its decomposition leave a perfectly amorphous coating upon the paper, where the light acts, and in proportion to the strength of its action from the lightest gray tint to the deepest black.

A second difficulty is the roughness of all surfaces upon which pictures can at present be taken. If we attempt to magnify a photograph, all the roughness of the paper or collodion which is imperceptible to unaided vision becomes apparent, and mingles its own images with that of the finer details, in such a way as to make complete confusion. The remedy is the discovery of new materials capable of receiving a polish so fine as to show a perfectly smooth surface under the highest magnifying powers.

The third and the greatest difficulty is the fact that in enlarging small pictures the amount of light reflected by them is constantly diminished, each picture becoming more indistinct than the one of which it is a copy, until finally the original image is completely extinguished. Formidable as this difficulty appears, it is within the range of possibility that it may be completely overcome. The reinforcement of the galvanic current obviates a similar difficulty which at one time threatened to interfere greatly with telegraphic communication. The reinforcement of a sound can make it audible through a large space where it apparently had totally ceased to exist. It remains to discover a means for the reinforcement of light. We believe that in time to come all the obstacles we have mentioned will be surmounted, and the photographic art will become the means of revealing the yet hidden mysteries of nature's grand laboratory.

Another difficulty, that relating to the imperfection of lenses, we will hereafter discuss.

## CONSTRUCTION OF FIRE-PROOF BUILDINGS.

We present on another page several illustrations of experments made by Messrs. Hoe & Co., of this city, which, with the details of the trials we consider of the greatest importance to builders and others. We accordingly invite the attention of our readers to the subject.

The insecurity of our buildings generally, especially their lack of resistance to the ravages of fire, is well known. The aggregate of the sums of money yearly expended for premiums for policies of insurance, would surprise, if it were known, every person. When real defense against fire is undertaken the cost of the erection of buildings is immensely enhanced. The walls must be of great thickness, of fire-proof materials, and laid with great care. The floors must be of similar materials, arched to sustain their superincumbent weight, and supported at intervals by strong columns. All the passages from one floor to another must be defended and guarded by proper devices. This mode of construction and these appliances are too costly for general use; what is needed is some cheaper mode of construction which shall not be less effective in confining fire to the floor in which it originates, without the necessity of constructing a perfectly fire-proof and costly building in the style now considered necessary. It would seem that this result has been partially, if not fully attained by the satisfactory experiments of the Messrs. Hoe.

In addition to their method of rendering floors fire-proof, a patent was obtained in 1860 by J B. Cornell, of this city, for the protection of iron columns in case of fire, which, in connection with the plan of Messrs. Hoe, would seem to render increased security to buildings attacked by fire. The plan is to inclose the supporting columns with a casing, the space between which and the column is filled with plaster of Paris or any other non-conducting material. The object is to prevent the disintegration of the metal composing the supporting column by heat.

The subject of erecting fire-proof buildings is of vast and growing importance, and we hope experiments will be made all over the country with a view of improving the mode of their construction.

PHOSPHATE DEPOSITS.—The discovery of immense deposits of bone phosphates in South Carolina, which, more than a year ago, was heralded by the press of the country, is again brought before the public. The entire coast and Sea Island regions of the Palmetto State are now supposed to be underlaid by the osseous remains of extinct land and marine creatures of past ages. The statement is also made that human bones as well as stone implements have been recognized. An analysis, made by the State Geologist of Massachusetts, of a sample from th Ashley river, shows in 100 parts of bone; moisture and organic matter, .80; bone phosphate of lime, 81.60; sulphate of lime, .65; salt, .15; sand, etc., 16.80.

FRANCE is well provided with lawyers and judges, governmental statistics showing that there is in the empire at least one man connected with the administration of justice for every 500 of the inhabitants, without counting the agents of external justice and city and rural police forces.

## Editorial Summary.

A NEW PYROMETER of English make, designed by Mr. Wood of the Tees Iron Works, consists of a metallic tube connected at one of its extremities to a pillar of porcelain, and at the other with an index on a dial, upon which the degrees of heat are measured. When used, the instrument is held over the aperture of a blast furnace, and the heated air passing through expands the tube longitudinally, and the difference in length as compared with the porcelain standard is indicated on the dial. In a recent experiment, the temperature was registered from 66° to 1,200° Fah. in less than a minute.

PHYSIOLOGICAL experiment has arrived at a close approximation to the average diurnal gain and loss in a man of one hundred and forty pounds weight. The daily gain is as follows:—

| | | |
|---|---|---|
| Oxygen | lbs. 2·192 | Inorganic gain, lbs., 6·301 |
| Water | lbs. 4·104 | |
| Dry vegetable food | lbs. 1·687 | Organic gain, lbs., 2·250 |
| Dry animal food | lbs. ·563 | |
| Total daily gain | | 8·551 |

The total daily loss in a healthy body will be exactly equal to the gain.

A LARGE collection of fossils from the green sand beds of the Squankum Marl Company, near Farmingdale, N. J., has been presented to the Peabody Museum of Yale College, by O. B. Kinne, of New York. This important acquisition consists of several thousand specimens, many of them new to science. Among the new vertebrate fossils, which will soon be described by Professor Marsh, are the remains of a huge swine-like animal, larger than a rhinoceros, and several others not previously discovered in this part of America.

IN AN important paper communicated to the Academy of Science, by M. A. Mallet, he stated that between 200° and 400° Fah., and in presence of steam, protochloride of copper absorbs oxygen from the air almost instantaneously to form an oxychloride, which parts with its one atom of chlorine at a higher temperature. So that oxygen gas, or chlorine gas, can be prepared at will, and in as large proportions as we wish, the same protochloride of copper serving over and over again.

BORAX AS A DETERGENT.—As a means of cleansing the hair, nothing is better than a solution of borax in water. It leaves the scalp in a most cleanly condition, and the hair just sufficiently stiffened to retain its place. This stiffness, however, can be readily removed, if objectionable, by washing with water. Borax is also an excellent dentrifice. Dissolved in water, it is one of the best of tooth washes.

THE use of raw meat in the treatment of debility and consumption is in the ascendant in France; but that it may be served in a style the least objectionable to the patient's delicate sensibilities, it is prepared under the name of musculine tablets, and is made of raw fillets of beef covered with fruit jelly and candied sugar.

A CANDIDATE for death honors proposes to shoot Niagara Falls in an india-rubber boat, oblong in shape, and with a mean diameter of eight feet, and six inches thick at the top and sides and three feet thickness at the bottom.

THE wire of a telegraph line just put up between Dover, N. H., and Lake Winnipiseogee is made of a steel core surrounded by copper. By this construction, it is claimed, the following advantages are secured: superior conducting power with less weight of metal, durability, and a less number of poles on the line.

OUT of the thirty-one days of the month of May, the residents of this latitude enjoyed twenty-three rainy days, amounting in the aggregate to a steady shower of 150 hours and 18 minutes, or 6 days, 6 hours, and 18 minutes duration. The depth of water that fell during that time, as measured by the hydrometer, was 6·98 inches, against 5·791 inches which fell during May of last year.

IN the town of Arkwright, N. Y., is a little lake which has no apparent inlet, but two outlets; through the one its waters flow into the Conewango river, thence through the Alleghany, Ohio, and Mississippi rivers to the Gulf of Mexico; the other outlet forms a branch of Silver Creek, which empties into Lake Erie, and its waters thus find their way into the ocean through the St. Lawrence.

NEARLY two acres of land on a farm in Hamilton county, Fla., lately disappeared from mortal view, the pasture land now being occupied by a lake of at least fifty feet in depth This sink is said to be the largest and deepest ever known in the State.

AN INTERESTING ELECTRICAL EXPERIMENT.—M. Becquerel, in making some researches into the subject of the dialysis of the electrical currents, lately found that in passing discharges from an induction coil, between the upper surface of a saline solution, contained in a glass tube, and the extremity of a platinum wire fixed at a short distance, the spark was surrounded with a cloud colored, according to the sort of salt used in the experiment.

HERSCHEL AND ARAGO found that the greater the number of spots on the sun during any year, the higher was the cost of breadstuffs. For the reason that the existence of these blots on the solar disk reduces the heat of the sun very materially. The experiments which led to this assertion were continued during a period of twenty-five years.

# OFFICIAL REPORT OF PATENTS AND CLAIMS

**Issued by the United States Patent Office.**

FOR THE WEEK ENDING JUNE 2, 1868.

*Reported Officially for the Scientific American.*

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

| | |
|---|---|
| On filing each Caveat | $10 |
| On filing each application for a Patent, except for a design | $15 |
| On issuing each original Patent | $20 |
| On appeal to Commissioner of Patents | $20 |
| On application for Reissue | $30 |
| On application for Extension of Patent | $50 |
| On granting the Extension | $50 |
| On filing a Disclaimer | $10 |
| On filing application for Design (three and a half years) | $10 |
| On filing application for Design (seven years) | $15 |
| On filing application for Design (fourteen years) | $30 |

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

*Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.*

**78,410.—GOVERNOR VALVE.—Robert Andrews and Edward Armstrong, Allegheny, Pa.** Antedated May 12, 1868.

We claim the arrangement of the valve, B, stem, C, spring, D, adjustable suspension bar, g, and columns, f, constructed, arranged, and operating substantially as herein described and for the purpose set forth.

**78,411.—CARRIER FOR BRAIDING MACHINE.—Dexter Avery, Westfield, Mass.**

I claim the hollow spindle, A, spring, D, and hook rod, C, in combination with the rod, e, sleeve, E, and arm, b, all made and operating substantially as and for the purpose herein shown and described.

**78,412.—FILLING FOR BEDS, CUSHIONS, ETC.—Geo. C. Barney, Chicago, Ill.**

I claim, 1st, As a new article of manufacture, a bed or mattress filled with paper cut in to small pieces, as herein shown and described.

2d, The use of paper cut into small pieces, for filling beds, mattresses, cushions, etc., as herein shown and described.

**78,413.—LAMP SHADE.—D. W. Bashore, Palmyra, Pa.** Antedated May 22, 1868.

I claim an adjustable shade, or lamp shade, constructed and arranged substantially as described.

2d, In combination with a lamp shade constructed as described, the openings in the same, at or near where it comes in contact with the chimney, substantially as described and for the purposes set forth.

**78,414.—CATAMENIAL SACK.—Andrew F. Baum, New York city, assignor to L. H. Rockwell.** Antedated May 22, 1868.

I claim an india rubber catamenial sack, formed with rolled edges, a a, substantially as described.

**78,415.—FEATHERING PADDLE WHEEL.—Robert Bell, East Saginaw, Mich.**

I claim, 1st, The combination of the circular plate, F, eccentric, E, rim, G, eccentric, H, eyes, I, and double buckets, D, all constructed and arranged as described, for the purpose specified.

2d, Constructing the buckets with two pieces or faces, a a, and fitting the same loosely on fixed axles, C, substantially as and for the purpose herein set forth.

3d, The eccentrics, H, of the double buckets, D, connected with the feathering rim, G, by means of eyes, I, fitted upon the eccentrics, and bolted to the sides of the rim, the latter being firmly secured to the plate, F, as herein described for the purpose specified.

4th, Having the end plates, b b, of the bucket slotted from their centers outward, with plates, K, bolted to the inner surfaces of the end plates, over the slots, substantially as and for the purpose set forth.

**78,416.—THILL AND POLE FOR CARRIAGES.—James W. Bicknell, New York city.**

I claim thills, or shafts, or poles of vehicles, made in whole or in part of tubular metal, substantially as herein specified.

**78,417.—CULTIVATOR.—A. R. Blood, A. Hathaway, and V. R. Beach, Independence, Iowa.**

We claim, 1st, The footpiece, M, arranged as described, for pressing the teeth in the ground, substantially as specified.

2d, The seed box, F, furnished with diamond-shaped holes, in combination with slide, c, likewise furnished with diamond-shaped holes, and arranged to operate as and for the purpose set forth.

3d, In combination with the above the cam lever, I, footpiece, M, and arms G G, to which are secured the teeth, J J, all arranged as and for the purpose set forth.

**78,418.—MACHINE FOR BENDING CIRCLES.—William Boyd, Hartford, N. Y.**

I claim the wheels, H I L, table, A, and jointed lever, C B E, set screws, b b, and circular faces, a a a, all constructed and operating substantially as and for the purpose shown and described.

**78,419.—CART BODY.—Wesley Bradley, Vienna, Me.**

I claim the bent rod, C, provided with the handle in combination with the pin for fastening, as shown, for the purpose herein described and set forth.

**76,420.—TIRE BINDING AND PUNCHING MACHINE.—James M. Bryan, Penningtonville, Pa.**

I claim, 1st, The arrangement herein described and shown of the levers, B and C, supports, B' and D', and stirrups, C' and d, for the purposes as set forth.

2d, The arrangement herein described of the rest, E, rollers, F F, adjustable die, d2 and mandrel, D, for the purposes set forth.

**78,421.—MACHINE FOR CLEANING AND RENOVATING FEATHERS.—Daniel Budd, Valatie, N. Y.**

I claim, 1st, An apparatus for cleansing and drying feathers, consisting of a feather holding vessel heated by means of steam admitted either into the vessel or into a jacket or jackets applied thereto, and combided with beaters or agitators for stirring the feathers within said vessel, substantially as and for the purposes shown and set forth.

2d, The combination with the feather holding vessel of the steam jackets or chambers upon the exterior of the same, one of said chambers being perforated so as to allow steam to pass into the interior of said vessel, and the branch pipes and cock for supplying the steam to said chambers, under the arrangement and for operation as set forth.

3d, The combination with the jacketed feather holding vessel, as described, of the rotary beaters or arms, and spindle and crank with which they are connected, mounted in the said vessel, substantially in the manner and for the purposes herein shown and set forth.

**78,422.—RAILROAD RAIL.—A G. Buzby, Philadelphia, Pa.**

I claim a clip composed of a thin flexible plate of steel or tough iron, bent and applied to a rail or rails, substantially as and for the purpose herein set forth.

**78,423.—MACHINE FOR SOWING FERTILIZERS AND SEEDS.—Daniel Caine, Battle Creek, Mich.**

I claim the hopper, A, in combination with the stirrer, E, clearer, F, and feeding roller, H, arranged relatively with each other and with an axle, D, and wheels, W, and constructed and operated in the manner and for the purpose as set forth.

**78,424.—CORN CULTIVATOR.—Alexander Campbell, Oxford, Ind.**

I claim the attaching of the upper ends of the standards, B, to the frame, A, by pivoting the former in mortises, b, in the latter, in connection with the rods, c, and the adjustable bar, e, attached to the draft pole, all arranged substantially as and for the purpose set forth.

**78,425.—ROTARY STEAM ENGINE.—Wesley B. Campbell (assignor to himself and Harrison Smith), Abingdon, Iowa.**

I claim, 1st, The arrangement of the wheel, B, floats, B', the ends, b, flanges, c, side plates, C, and steam chest, A, whereby to relieve the hub from the pressure of the steam, substantially as set forth.

2d, The arrangement of the wheel, B, the valves, F, arms, G, rods, H, and cams, I, substantially as set forth.

**78,426.—STEAM BOILER FURNACE.—N. L. Carpenter, Natchez, Miss.**

I claim, 1st, In combination with a steam boiler, the wells or recesses, D, E and F (more or less in number), and the deflecting plates, G, arranged substantially as and for the purposes herein shown and described.

2d, In combination with the wells, D E and F, and plates, G, the perforated air tube, H, substantially as and for the purposes described.

**78,427.—RINGS FOR SPINNING MACHINES.—Wm. T. Carroll, Medway, Mass.**

I claim the combination as well as arrangement of the flange, c, or the posts, f, and the adjusting screws, e, with the ring, A, and the supporter, B, thereof, to be placed on and within the ring rail, as specified.

**78,428.—THRUST BEARING.—A. W. Case, South Manchester, Conn.**

I claim, 1st, An improved thrust bearing, formed by the combination of the wheels, E, one or both, and friction wheel, D, with each other and with the shaft, B, substantially as herein shown and described and for the purpose set forth.

2d, The oiling device formed by passing a piece of candle wick or other suitable fibrous conductor, through holes in the blocks, C, and along grooves in the under side of the journals of the friction wheels, D, substantially as herein shown and described and for the purpose set forth.

**78,429.—RAILROAD FROG.—Henry S. Chapin, Delhi, Ohio.**

I claim the chairs, A, constructed substantially as set forth in the described combination, with the sections or pieces of rails, B C D E, arranged as described and for the purpose set forth.

**78,430.—APPARATUS FOR CONVEYING AND DUMPING COAL.—Henry C. Clark and Robert B. Little, Providence, R. I.**

We claim, 1st, The construction of a conveying and dumping apparatus or bucket, A, with a hinged front gate, B, and stop, a, attached thereto, and operating substantially as herein shown and described.

2d, The clasp, F, for securing the rope, C, to the truck, D, said clasp consisting of two plates, c and d, hinged and locked together, substantially as herein shown and described.

3d, The adjustable carriage, G, running on the outer edge of the track, E, and holding the dumping ball, H, suspended by a chain or cord, n, the said carriage being free to be moved upward on the track, substantially as and for the purpose herein shown and described.

4th, A coal conveying and dumping apparatus, consisting of the bucket, A, having the hinged front, B, with the stop, a, of the rope, C, clasp, F, truck, D, carriage, G, and ball, H, all combined with each other, and made and operating substantially as herein shown and described.

**78,431.—UTERINE SUPPORTER.—S. P. Cole, Janesville, Wis.**

I claim the uterine supporter, formed by the combination of the soft rubber cushion, A, of elliptical form, the cup, B, soft rubber ring, B, and soft rubber diaphragm, d, substantially as herein shown and described, for the purpose specified.

**78,432.—SAND THROWING MACHINE.—W. H. Cox, Portland, Me.**

I claim the sand throwing machine or device, constructed as herein set forth and for the purposes specified.

**78,433.—HOP BOX.—Wm. B. Crandell, Deansville, N. Y.**

I claim the hop boxes, a a a a, and bottomless compartment boxes, d d d d, substantially as shown and described, constructed and employed together, all as and for the purpose set forth.

**78,434.—PRESS FOR FINISHING BRICK.—Lyman B. Crittenden, Pittsburg, Pa.**

I claim, 1st, In a machine for pressing brick, the construction and use, either singly or in gangs, of a plunger, m, chambered on its under face, and fitted with a sub plunger, of any elastic or non-elastic material, such sub-plunger being supported by or resting against a spring or cushion of condensed air, or other equivalent device, substantially as and for the purposes hereinbefore set forth.

2d, The use of wedge shaped guides, l, in connection with a cross bar, h, or its equivalent, for regulating the position of the bricks on each platen or its equivalent, they shall be fed directly under the pressing devices, substantially as above set forth.

3d, The boxes, l, and plungers, m, with suitable devices for imparting to them the motions described, in combination with a feeding device, consisting of a sliding frame, D, cross bar, h, and guides, l, the whole being constructed and operated substantially in the manner and for the purposes hereinbefore set forth.

**78,435.—FILE.—G. B. Cubberley, Milwaukee, Wis.** Antedated May 20, 1868.

I claim stock, A, end blocks, B, side key, C, and teeth, D, in combination, substantially as and for the purpose described.

**79,436.—HORSESHOE.—J. M. Cuykendall, Metomen, Wis.**

I claim, 1st, Inserting the screws, D, into the side of the shoe, directly beneath the calks, in such a manner that the heads of the screws bind upon the calks and secure them in place, substantially as herein shown and described.

2d, The groove, c, in the center of the tenon, a', of the toe calk, C, in combination with the tenon, d, in the groove, b', and with the screw, D, all made and arranged substantially as and for the purposes herein shown and described.

**78,437.—FRUIT PRESERVING BOX.—O. E. Doolittle, Boston, Mass.**

I claim, 1st, The combination and arrangement of two or more boxes, the inner one being the containing box, and the space between filled with air and communicating with the inside of the containing box by the help of slats or apertures, when the same is used in combination with a moisture-absorbing substance contained within the limits of the inner box for the purpose of preserving fruit, all substantially as described.

2d, In boxes for preserving or containing fruit, the placing of a moisture-absorbing substance or substances in communication with the atmosphere around the fruit, all substantially as and for the purpose described.

**78,438.—BOOT CRIMPING MACHINE.—R. H. Dorn (assignor to himself and I. G. Greene), Port Henry, N. Y.**

I claim, 1st, The slide, B, provided with the crimping formers, b', in combination with the clamping sliding jaws, c c, substantially as and for the purpose described.

2d, The slide, B, provided with the crimping forms, b', in combination with the clamping sliding jaws, c c, provided with the ridged plates, D, substantially as and for the purpose described.

3d, The combination with the plates, c c, slide, B, and crimping forms, of the smoothing rollers, substantially as and for the purpose described.

**78,439.—CARRIAGE SPRING.—George Douglass, Bridgeport, Conn.**

I claim the insertion of india rubber strips, b b, in chambers or recesses, a a, in the cast metal socket or seat, A, of the spring, substantially in the manner as and for the purpose herein set forth.

**78,440.—WASHING MACHINE.—Noah Drew, Howell, Mich.**

I claim a connecting rod constructed in two parts, r1 r2, in combination with the tube, t, spiral or equivalent spring, s, and adjustable plunger heads, p, substantially as and for the purpose herein described.

**78,441.—TEMPLE FOR LOOMS.—Warren W. Dutcher, Hopedale, Mass.**

I claim the temple constructed substantially as described, the trough standard and the inner end of the overhanging cap being provided with sockets closed at their outer ends, such sockets being to receive and hold the roller spindle in place, in manner as set forth.

**78,442.—COMBINED CULTIVATOR AND HOE.—Harmon P. Eckles, Catskill, N. Y.**

I claim, 1st, The fans or paddles, f f, when attached to shafts, K K, and operated substantially as and for the purpose specified.

2d, The combination of the shafts, A and K K, gear wheels, I I, and H H, and frame, S, when arranged substantially as described, and for the purpose of operating the paddles or plates, f f, as herein specified.

3d, The combination of the cultivator frame, L, with its teeth, M M, secured to the frame, C, as described, with the shafts, K K, frame, S, and paddles, f f, for the purpose of cultivating or pulverizing the earth, and ridging or hilling the same at one and the same time, as set forth.

**78,443.—SAW MILL.—Augustus R. Ehlers, Tannersville, Pa.**

I claim the combination and arrangement of the oscillating slide, c, the oscillating guide rods, e e, the rock shafts, g g, and the eccentric, k, on the driving shaft, B, for producing a forward and backward movement of the saw below its upper end, which moves in the same vertical plane, as herein shown and described.

**78,444.—MOP HEAD.—Lucius H. Emmons, Noblesville, Ind.**

I claim the piece, A, furnished with the hooks, D, and the piece, E, arranged in relation thereto, and operated by means of the screw, B, substantially as and for the purpose set forth.

**78,445.—ADJUSTMENT OF GEARING FOR HORSE-POWER.—John S. Everitt, Oshkosh, Wis.**

I claim the clutch, with inclined faces, for the purpose of adjusting the gearing of the horse-power, as set forth.

**78,446.—HAND STAMP.—August Fessler, Vienna, Austria, assignor to Joseph R. Von Wessely, New York City.**

I claim, 1st, The large air-tight tubular reservoir, constructed and arranged as and for the purposes set forth.

2d, The combination of the open frame, the tubular reservoir, the tubular handle, the yoke, the stamp, and the reversing devices, these parts being arranged as described for joint operation.

**78,447.—VENT FOR BARREL.—Richard C. Fleming, Philadelphia, Pa.**

I claim 1st, The combination of the screw ring, A, with the tube, C, tubular rod, E, and bag, D, all made and operating substantially as herein shown and described.

2d, The bellows, F, in combination with the device set forth in the foregoing clause.

**78,448.—MACHINE FOR GRINDING THE CUTTERS OF MOWING MACHINES.—Andrew French, Philadelphia, Pa.**

I claim, 1st, The swinging or vibrating frame, G, hinged at the end opposite the grindstone or emery wheel, consisting of the post, l, arm, k, and continuation, V, of the said arm, k, in combination with the lowering and raising adjustments, made in the manner and for the purpose described.

2d, The guide plate, B, made in the manner and for the purpose described.

3d, The slide, D, and set screw, e, in combination with the guide plate, B, swinging or vibrating frame, G, and sliding slot, U, as described, and made in the manner and for the purpose indicated.

4th, The wheels or pulleys, M and N, swinging or vibrating frame, G, slide, D, set screw, e, and emery wheel or grindstone, C, in combination with the guide plate, B, made in the manner and for the purpose described.

**78,449.—DOOR LOCK.—J. E. A. Gibbs, Steele's Tavern, Va.**

I claim, 1st, The combination of the series of guards or wards, N, with the slotted cylinder, E, substantially as herein shown and described and for the purpose set forth.

2d, Forming the key, K, in such a manner that it may fill up the slot in the cylinder, E, and so that its face may correspond with the face of said cylinder, substantially as herein shown and described and for the purpose set forth.

3d, The combination of the tumbler, L, with the slotted cylinder, E, and with the guards or wards, N, substantially as herein shown and described and for the purpose set forth.

**78,450.—STUMP EXTRACTOR.—Alfred Goodrich, Burnt Prairie, Ill.**

I claim the construction and arrangement of the pyramidal frame, P, upon the runners, R, shaft, S, ratchet wheels, u w, of unequal diameters, pawl, h, standard, s', pivoted lever, L, and link, i, as herein described for the purpose specified.

**78,451.—REFLECTING GAS BURNER.—Thomas Grist, Philadelphia, Pa.** Antedated May 19, 1868.

I claim, 1st, The arrangement of the burner, e, on the top of the reflector, F, as and for the purpose set forth.

2d, The combination of the distributer, B, pipe, E, passing through the reflector, and the burner, e.

3d, The perforated washers, h and i, in combination with the pipe, F, the reflector, F, and the openings in the latter.

**78,452.—GATE.—William C. Hooker, Abington, Ill.**

I claim the gate, B B B, swung between the swinging frames, D D, substantially in combination with cords, E E, or their equivalent, the uprights, A A, and weights, J J, all as and for the purpose set forth.

**78,453.—WARPING FRAME.—C. H. Howard (assignor by mesne assignment to himself and Horace S. Jordan), Lewiston, Me.**

I claim the combination with the stationary guide, guide rolls or rods, o, of the weighted rising rod, bar, or roll, so arranged as, in its ascent, to take up the slack, substantially as set forth.

**78,454.—VALVE GEAR FOR STEAM HEATING APPARATUS.—Henry Howard, Springfield, Mass.**

I claim, 1st, The double case, F, in combination with valves, g g', substantially as herein set forth.

2d, The partitioned pipe, G, formed on the double valve case, F, as herein specified.

3d, The prolongation, I, formed on pipe, G, as herein specified.

4th, The valve, g, and stem, c, in combination with the valve, g', and stem, c', bar, D, screw, E, and case, F, substantially as herein specified.

**78,455.—PAVEMENT FOR STREETS AND WALKS.—Asa Hoyt, Chicago, Ill.**

I claim, 1st, The use of gas-house lime in compounding street pavements when mixed and applied, substantially as specified and for the purposes set forth.

2d, A pavement compounded as specified, that is, of small stone and gravel, coal or pine tar, sand, cement, and gas-house lime.

3d, The use of alum water at the time of laying, as specified.

**78,456.—FURNACE FOR ROASTING ORES.—Edward P. Hudson, New York city.**

I claim forcing heated air or oxygen, in addition to the products of combustion, through ores, for the purpose of removing sulphur, phosphorus, and similar injurious substances therefrom, substantially as herein specified.

Also, the chamber or reservoir, a, below the bottom of the fire chambers or flues, with a passage or passages, b, at or near the base thereof, through which air is forced and heated by the roasted ores therein, and in turn cools the said ores ready for withdrawal, substantially as herein specified.

Also, introducing air, in excess of that required for combustion, but regulated in quantity, into the ores, through the fire chambers, over the fires, so as to be heated thereby, before passing through the ores, substantially as herein specified.

Also, the arrangement of one fire chamber higher than the other, substantially as and for the purpose herein specified.

**78,457.—PLOW.—Samuel Hulbert, Ogdensburg, N. Y.**

I claim the improved manner of fastening the plow and cultivator together, separately and connectedly, in manner and for the purposes as herein described and constructed.

**78,458.—VENEER CUTTING MACHINE.—Edward Jewett, Rindge, N. H.** Antedated May 18, 1868.

I claim attaching and securing the "bolt" to the carriage, A, by means of dove-tailed ribs, D D, substantially as and for the purpose set forth.

The adjustable ribs, D D, moving in grooves cut in the carriage A, and secured by set screws, or their equivalent, substantially as and for the purpose set forth.

The vertically adjustable clamping rib (fig. 2), substantially as and for the purpose set forth.

**78,459.—LIGHTNING ROD.—George Kirtland (assignor to S. Smith), New Haven, Conn.**

I claim, 1st, The internal connection for tubular lightning rods, constructed substantially in the manner herein set forth.

2d, The socket, L, provided with an india-rubber packing, in combination with the rod, E, so as to operate substantially as specified.

**78,460.—HARVESTER CUTTER.—Moses Lewis, Odell, Ill.**

I claim the removable bars, D F, adapted to be substituted, one for the other, in the same finger bar, for reaping or mowing, as herein shown and described.

**78,461.—TIGHTENING WHEEL TIRES.—Thomas R. Markillie, Winchester, Ill.** Antedated May 27, 1868.

I claim the cap, E, with side walls thickened at e, for the purpose described, the plates, c c, the shoe, F, and bolts, d, arranged as described, combined with the tire, B, and felloe, A, substantially as and for the purpose set forth.

**78,462.—RAILWAY.—Carlo Margutti, Milan, Italy.**

I claim, 1st, A locomotive, provided with the eccentric segments, F which act upon a corrugated or wave-shaped rail, M, in the manner substantially as shown and described.

2d, Operating the eccentric segments, F', by means of the reciprocating bars, D D', and the attached bearings, E, of the same, substantially as shown and described and for the purposes set forth.

3d, The combination of the reciprocating bars, D D', with the steam driving cylinders, P, substantially as shown and described and for the purposes set forth.

4th, The arrangement of the bars, D D', connected together substantially in the manner shown and described, so that the movements of the bars, D D', on one side, and its attachments, will produce a movement in the opposite direction of the other bars, D D', and their attachments.

5th, The combination of the reversing pulleys, F, with the eccentric segments, F', substantially as herein shown and described.

6th, The springs, s, in combination with the eccentric segments, F', substantially as shown and described and for the purposes set forth.

7th, The slots, s2, in the eccentric segments, F', as and for the purposes shown and described.

8th, In combination with the eccentric segments, F', and pulleys, F, the buttons, e, for holding said segments, F', against the pulleys, F, substantially as shown and described.

9th, In combination with the eccentric segments, F', the rail, M, constructed and arranged substantially as described for the purpose specified.

10th, The propulsion of railway cars by means of corrugated or worm-shaped rails, M, and a locomotive mechanism in conjunction with said rails substantially as shown and described and for the purposes set forth.

**78,463.—MOUNTING PICKER STAFFS.—William Mason, Taunton, Mass.**

I claim the bed, formed with a V-shaped groove, and the rocker, with its under surface of the corresponding form, in combination with the open link, by which the rocker is kept in place on the bed, substantially as and for the purpose set forth.

**78,464.—GANG PLOW.—Don Carlos Matteson, Stockton, Cal.**

I claim, 1st, The bars, E F, attached to the front ends of the beams, A B, with the perforated draft bar, G, attached thereto, substantially as and for the purpose specified.

2d, The attaching of the caster wheel, J, to a single arbor, K, provided with a scraper, f, substantially as and for the purpose set forth.

**78,465.—GAS MACHINE.—Hiram S. Maxim and John F. Lockwood, New York city.**

We claim, 1st, In an apparatus for making carbureted air, controlling the heat used for evaporating the hydrocarbon liquid by the pressure of the contents of the vessel in which the said liquid is held, as set forth.

2d, Constructing the tank, A, with an elastic head, side, or bottom, b, by which the position of the valve, B, is controlled, as set forth.

3d, Drawing the air to be carbureted into the pipes through which the hydrocarbon vapor is conducted by means of the escaping force of the vapor, as set forth.

4th, The manner herein described of heating or boiling hydrocarbon liquid with a flame of its own gas, said flame being increased or diminished by the pressure of the vapor so generated, as set forth.

5th, The tank, A, valve, B, pipes, c d f and g, arranged and operating as set forth, to cause the heating of the contents of the tank, as set forth.

6th, The above, in combination with the elastic head, b, made as set forth.

7th, Arranging an independent burner, i, in the pipe, D, substantially as set forth, for the purpose of igniting the burners, g g, as specified.

8th, The jet pipe, j, arranged in the tube, E, for the purpose of causing the escaping vapors to draw air into the tube, E, and to have such air carbureted, as set forth.

9th, The outer case, G, in combination with the gas apparatus, as set forth, said case being provided with apertures or valves.

10th, A gas machine, made and operating substantially as herein shown and described, and consisting of the tank, A, elastic head, b, valve rod, C valve, B, pipes, c d f and g, discharge pipes, D and E, jets, h and j, burner I, and splashing board, n, all made as set forth.

**78,466.—BRIDLE BIT.—Patrick J. McGuinness, New York city.**

I claim as a new article of manufacture, a curb and driving bit, consisting of the bars, A B, provided with rings, b, stops, c, and sliding check pieces d, when said bars are each curved in opposite directions from the center, all constructed, arranged, and operating as set forth.

**78,467.—CAR AXLE AND WHEEL.—James Montgomery, Croton, N. Y.** Antedated May 16, 1868.

I claim, 1st, In reversely conical-shaped axles, made up of segmental bars, as described, the insertion, between the latter, and welding with them at their ends, of I-shaped bars, substantially as specified.

2d, The combination, with a reversely conical-shaped axle, composed of segmental or separate bars, arranged as specified, of the outer ring and interior central brace, B, cast in one piece, and through which the bars are run or passed, as herein set forth.

3d, The combination, with the axle made of wrought metal, of the wheel hubs or central portions cast thereon, together with their bearings or journals, essentially as specified.

**78 468.—ORE SEPARATOR.—R. C. Morton, West Lubeck, Me.**

I claim, 1st, The series of lever or hinged plungers, C C' C'' C''' etc., acting upon the series of cells, D D' D'' D''', substantially as shown and described in combination with the corresponding compartment tray, H, all as and for the purpose set forth.

2d, The adjustable bars, a, substantially as shown and described, in combination with the rollers, d, and cams, e, of the shaft, h, all as and for the purpose set forth.

3d, The lever cocks, k, substantially as shown and described, in combination with the box, G, slide, E and plungers, all substantially as shown and described and for the purpose set forth.

4th, The bar, A, rubber springs, j, plates, f, and lever plungers, all constructed and operating substantially as shown and described and for the purpose set forth.

5th, Tray, H, having partitions, n n n, substantially as shown and described, in combination with a series of plungers and a series of cells, D D' D'' D''', all as and for the purpose set forth.

**78,469.—STUMP EXTRACTOR.—Crawford Munns, N. Y. city.**

I claim, 1st, The pintle, d, in combination with a stump extractor and its base or platform, substantially as described for the purpose specified.

2d, The triangular frames, A A, of a stump extractor, arranged substantially as shown and described, and secured to the base B, by means of the pintle bolt, d, or its equivalent, for the purpose set forth.

3d, The hinged levers, B' B', and base, B, in combination with a stump extractor, all constructed, arranged, and operating substantially as shown and described for the purpose set forth.

4th, The platform, B, substantially as shown and described, when combined with the pintle bolt, d, of a stump extracting machine, all as set forth.

**78,470.—MACHINE FOR CROZING AND CHAMFERING BARRELS Charles Murdock, Ellenville, N. Y.** Antedated May 18, 1868.

I claim, 1st, The combination of the sliding frames, E E, upon each side of the main frame, and bearing the crozing and chamfering cutters, J K, with the barrel holding frame, g, all operating as described, whereby both ends of the barrel are chamfered and crozed at the same time, as herein shown and described.

2d, The arrangement of the sliding frames, E E, in which the cutter head shafts are hung and turn, connecting rods, V V, and lever arm, T, in combination with the sector shaped arm, R, all arranged together and operating as and for the purpose specified.

3d, The arrangement of the sliding sleeve, Y, having wedge shaped arms, of the cutter head shafts, connecting levers, W W, lever arm, U, and sector shaped arm, S, all connected together and operating as and for the purpose specified.

4th, The barrel-holding frame, g, having spring jaws, for grasping and holding the barrel while being operated upon by the croze and chamfer cutters, arranged so as to be raised or lowered, substantially in the manner described and for the purpose specified.

78,471.—TWEER.—William H. Myers (assignor to Sylvester Matthias), Baltimore, Md.

I claim an escape pipe, D, or its equivalent, independent of the duct which conveys the blast to the fire, descending from the center of the tweer, to convey away ashes, dust, etc., from bottom of the fire, and to admit a direct draft when the bellows is not in operation, substantially as set forth.

A tweer, constructed with the air chamber, B, outlets, C C, and the escape pipe, D, substantially as described.

78,472.—TAILOR'S SEAT.—Friedrich Neuhaus, Belleville, Ill.

I claim, 1st, A tailor's seat, provided with a back, B, and an adjustable knee support, E, substantially as herein shown and described,

2d, The devices herein shown and described of attaching the cushion, F, to the seat, A, said devices consisting of the eye, a, rods, C D and E, all made as described, and operating so as to allow the backward and forward, up and down, and lateral adjustment of the cushion, as set forth.

78,473.—POTATO DIGGER.—H. B. Norton, Rochester, N. Y.

I claim, 1st, The combination of the loose frame, C, carrying the operating apparatus, with the axle and driving wheels, when said frame is capable of being elevated by the joint action of the team and operator, as herein set forth.

2d, The combination of the folding bars, L L, with the lever, K, and frame, C, in the manner and for the purpose specified.

3d, The arched axle, B, when employed in combination with the driving wheels, A, and endless apron, I, whereby the edge of the wheels may be reduced to the minimum, and a free passage for vines is left over the apron, as herein set forth.

4th, The shares, D D, set angularly, and with the land sides inward, in combination with the scraper, H, whereby the sides of the row are first plowed off, and then scooped up, as herein set forth.

5th, Adjusting the shares, D D, centrally, irrespective of the scraper, both at the top and bottom, by the slots, b b', as herein described.

6th, The construction and arrangement of the bearings, t, rollers, s s', and angular caps, u, as herein specified.

7th, The combination of the inclosed and alternating agitator, W, with the endless apron, I, as herein set forth.

8th, The combination of the side guards, E E, with the endless apron, I, as herein specified.

9th, The construction and arrangement of the endless apron, the same consisting of the flexible sides, v v, the A-shaped or half-circular slats, w, and the stay pieces, w', united by rivets, the whole operating in the manner and for the purpose specified.

10th, The combination of the tension rods, e, with the plow standards, s, and endless apron, I, whereby the plows, scraper, and apron are drawn forward at pleasure, to make them taut, as herein set forth.

11th, The combination and arrangement of the offsets or notches, h', and the springs, z, with the curved slots, h, in the manner and for the purpose specified.

12th, The combination of the door, r, and lever, q, with the open receptacle, M, arranged and operating as herein set forth.

13th, The employment of two bearing rollers, s s, on opposite sides, for sustaining the front end of the apron without a connecting shaft, as herein set forth.

78,474.—FRUIT JAR.—H. B. Norton, Rochester, N. Y.

I claim in combination with the concentric rims, b b', projecting vertically from the cover, B, the externally beveled mouth, d, of the jar, for compressing the packing substance against the outer flange, to prevent its entering and commingling with the contents of the jar, substantially as set forth.

78,475.—RAILROAD CAR STOVE.—R. O'Brien, Dalton, Ohio.

I claim, 1st, The combination of the arm, H, and weight, I, with the spindle, D, of the pivoted frame, C, substantially as herein shown and described and for the purpose set forth.

2d, The detachable bed plate, M, in combination with the pivoted frame, C, and swinging stove, A, substantially as herein shown and described and for the purpose set forth.

3d, An improved railroad car stove formed by the combination of the swinging stove, A, pivoted frame, C, supporting frame, E, weighted arm, H I, and detachable bed plate, M, with each other, said parts being constructed and arranged substantially as herein shown and described and for the purpose set forth.

78,476.—EXTENSION STEP LADDER.—G. W. Packer, Toulon, Ill.

I claim an extension step ladder consisting of the hinged parts, B C, truss, E, and chains, G, constructed and arranged substantially as herein described.

78,477.—MANUFACTURE OF PLATES OF COMBINED STEEL AND IRON.—James Park, Jr., Pittsburg, Pa.

I claim giving a welding heat to the iron or fibrous metal side only of the ingots, in the manner hereinbefore described, and then uniting these surfaces by welding them together, either with or without an interposed layer of wrought iron or other fibrous and malleable metal, substantially as hereinbefore set forth.

78,478.—TABLE AND QUILTING FRAME.—Milton E. Phillips (assignor to himself, Paul Wetzel, and George Wetzel), Lena, Ill.

I claim the combination, substantially as set forth, with a centrally-divided eg, a centrally divided hinged table top, pivoted supports, and spring detents, of horizontal frame pieces, ratchets, and a horizontal brace, for the purposes specified.

78,479.—NAIL EXTRACTOR.—I. A. Pinnell, Boonville, Mo.

I claim the lever handle, A, fulcrum bar, C, having the curved fulcrum, b, the claw levers, D and E, having the claws, a a, all pivoted together, constructed to operate substantially as shown and described and for the purpose set forth.

78,480.—WHEEL.—Henry Poth, Pittsburg, Pa.

I claim the hub flanges, a a, provided with corresponding wedge feathers, b b, when adapted to be drawn together by means of the differential screw box, d e, on which the screw caps, g, are fitted, the tenons of the spokes being protected by elastic material, k, all constructed and arranged as and for the purpose described.

78,481.—LOW WATER INDICATOR.—John C. Raymond and Francis T. Allyn, Brooklyn, N. Y., assignors to F. T. Allyn.

We claim the stop, q, in combination with with the lever, k, rod, o, nut, p, expanding tube, c, and with the valve stem, i, of the whistle, all as shown and described.

78,482.—HARVESTER.—George Rector, Sodus, Mich.

I claim, 1st, the arrangement of the rock shaft, a, and the two sickle bars, d and h, the latter being located in line with the tread of the wheels, and hinged to the adjustable yoke, D, substantially as described.

2d, The U-shaped frame, D, with the horizontally projecting arm to which the finger bar is hinged, and having bar is the projecting brace bar, G, arranged to bear against the rear side of the finger bar, said frame, D, being adjustable vertically, all constructed and arranged to operate as herein described.

3d, The combination of the driving gear, L, crank shaft, i, with its sliding gear, m, pitman, n, and rock shaft, a, when said parts are constructed and arranged to operate as and for the purpose set forth.

4th, The combination of the two sickle bars, d and h, pitman, i, and rock shaft, a, provided with its two arms, and crank, r, having a series of holes for adjusting the stroke, as herein set forth.

78,483.—VALVE FOR STEAM ENGINES.—Alex. K. Rider, Nazareth, Pa., assignor to himself, C. H. Delamater, and G. H. Reynolds.

I claim the master valves, D1 D2, operated by and controlling in turn the action of the steam in throwing the main valve, G, substantially as and for the purposes herein set forth.

78,484.—ELEVATOR FOR CULTIVATOR BARS.—J. S. Rowell and Ira Rowell, Beaver Dam, Wis.

We claim, 1st, The roller stands or bearings constructed and arranged as and for the purpose set forth.

2d, The sheaves, D D', provided with the inclined catch, d, and lop, c, in combination with the ratchet, b.

3d, Pivoting the jaw, as described, out of line with the groove in the sheave, so as to form an automatic locking and unlocking device, as set forth.

4th, The combination of the sheaves, D D', bearings, B B', and roller, C, as arranged, and operating in the manner and for the purposes set forth.

78,485.—APPARATUS FOR CURING HOPS.—J. S. Sandt, St. Joseph, Mo.

I claim, 1st, The ventilators H H', lever, S, ropes, e e' and g, pulley, p, and wheel, P, of a hop-curing house, all arranged in relation to each other substantially as and for the purpose specified.

2d, The racks, b b', shaft, B, with its pinions, c c1, driving wheel, C, with its radial arms, d d1 d2, etc., h h1 h2, etc., pulley, D, wheel, E, and endless rope, m, of a hop-curing house, all arranged relatively to each other substantially as and for the purpose specified.

3d, A hop curing house combining the above specified devices, all arranged substantially as and for the purpose specified.

78,486.—MACHINE FOR GROOVING SHEET METAL.—William Serviss, Sidney, Ohio, assignor to Jason McVay and Jason S. Carey.

I claim, 1st, The offset, F, substantially as shown and described, in combination with the rack, D, wheel, G, and arm, B, as and for the purpose set forth.

2d, The gage, E, constructed and operating substantially as and for the purpose shown and described, in combination with the arms, C and B, and wheel, G, all as set forth.

78,487.—VINE TRELLIS.—Carl Seyler, Cleveland, Ohio.

I claim the ping or shaft, D, studs, a', and ring, F, as arranged, in combination with the arms, A, for the purpose and in the manner substantially as set forth.

78,488.—FLOATING WATER POWER.—Albert B. Shepard, Sand Bank, N. Y.

I claim the arrangement upon the floats, A A A, of the wheels, C, keyed upon the shaft, D, having the gear wheel, E, the shaft, F, having the beveled pinion, G, and pulley, K, the hinged frame, H, supporting the pulley shaft, g, and attached to the shore by the shaft, H', as herein described, for the purpose specified.

78,489.—FLIER FOR SPINNING MACHINES.—Harvey Silver, Lowell, Mass. Antedated May 23, 1868.

I claim, 1st, The spring portion, shown and described, when combined with the saddle and constructed and arranged for the removal and replacing of the guide pin, e, for the purpose and substantially as described.

2d, The guide pin, e, when constructed as described, and applied to the spring portion and the saddle, c, as and for the purpose described.

3d, The combination of the saddle, spring portion, and pin with the flier arm or arms, for the purpose and substantially as described.

78,490.—HARVESTER.—Lorenzo D. Snook, Barrington, N. Y.

I claim, 1st, The construction and arrangement of the lever, provided with the anti-friction wheels and arm, with the plate, F, and forked wedge-shaped lever, G, when applied and actuated as and for the purpose set forth.

2d, The laterally adjustable coupling, E, in combination with the connection, H, when made and used as and for the purpose specified.

3d, The hook, L, when made and applied to keep the cutter bar in place, substantially as specified.

78,491.—SELF-FASTENING BUCKLE.—William W. Spencer, Pittsburg, Pa.

I claim a buckle provided at each end with two transverse bars, c c, arranged as described, for facilitating the casting process, in combination with transverse bars, F and G, as and for the purpose set forth.

78,492.—PLOW.—C. Ph. Steinmetz, Madison, Wis.

I claim, 1st, The swivel clevis, a, as constructed, arranged, and fully described and shown.

2d, The combination of the reversible plowshare, A, or cultivator share, E, with the vibrating upright shaft, B, lever, D, and stop, C, as shown and described.

3d, The swivel clevis, a, reversible plowshare, A, or cultivator share, E, vibrating shaft, B, lever, D, and stop, C, notched bar or standard, e, with wheel, key, f, and plates, F, all constructed and arranged in combination with a plow frame, as shown and described.

78,493.—EAR TRUMPET.—Thos. H. Stilwell, M.D., New York city. Antedated May 18, 1868.

I claim the tubular trumbets, A A, connected by means of a wire rod, B, and having vibrating wires, C, arranged within them, substantially as and for the purpose specified.

78,494.—SUSPENDER.—Wm. P. Towles, Baltimore, Md.

I claim the combination and arrangement of the adjustable non-elastic shoulder straps, C, center, A, elastic strap, D, rings, E, and buttonhole straps B, substantially as and for the purpose herein shown and described.

78,495.—TELEGRAPHING.—C. F. Varley, London, England.

I claim, 1st, So arranging telegraphic apparatus as to work by the variation of the increment and decrement of electric potential, and not by the direct action of the electric current itself, as and for the purposes set forth.

2d, The use of an induction coil at the receiving end of the cable, one of its wires being connected between the cable and the ground, and the other or secondary wire connected with the receiving instrument, as and for the purposes set forth.

3d, The use of a condenser or condensers between the receiving end of the cable and the earth, with or without resistance coils between the cable and the earth, as and for the purposes set forth.

4th, The use of a condenser at the sending end of the cable, with or without resistance coils connecting its two armatures, as and for the purposes set forth.

5th, The use of a condenser at each end of the cable, the cable being connected with the sending instrument, as and for the purposes set forth.

78,496.—CAP FOR MARINE SIGNAL BUOYS.—George Warner, Cleveland, Ohio.

I claim the top shield, C, and the two flexible side sections, B B, in combination with the cap, A, as described, and when used in the manner specified, for the purposes set forth.

78,497.—ELECTRO-PLATING FRAME.—William H. Watrous, Hartford, Conn.

I claim the holding frame, A, constructed substantially as and for the purposes herein shown and described.

78,498.—APPARATUS FOR DISTILLING.—Alexander Webster, Seneca Falls, N. Y.

I claim the cap, combined with the cylinder, A, and the tube, B, substantially as and for the purposes described, separating the lighter and more refined portion of the vapor which rises from a still in the process of distillation from the heavier portions, for the purpose of obtaining two or more qualities of liquor, substantially as described.

78,499.—SELF-BORING STOP COCK.—Alfred Weed, Boston, Mass.

I claim a faucet provided with a screw thread, f, on its barrel, for the purpose set forth, its entering end provided with a closed boring tool, d, and the blank or smooth surface, o, between the screw thread and the boring tool, in which blank surface are the inlets, c, communicating with the passage through the faucet, and also provided with handles, e, by which the borer is turned, the smooth surface pushed into the tap hole, and the faucet turned as it is screwed into the tap hole.

78,500.—RAILWAY SWITCH.—Wm. Wharton, Jr., Philadelphia, Pa.

I claim switch rails arranged to move laterally from a fixed point, in combination with a shaft having two or more graduated cranks, or their equivalents, for serving the two fold purpose of operating and laterally steadying at different points the said switch rails, substantially as set forth.

78,501.—PLOW.—Wm. Whiteley, Springfield, Ohio.

I claim, 1st, The construction and use of plows, when the shapes of those parts which cut and invert the furrow slice are determined and obtained by the herein described rule, substantially as set forth.

2d, The method of obtaining modified forms of the plow shape, substantially as herein described.

3d, In combination with the draft bolt, J, the stirrup, G, or its equivalent, which surrounds both bolt and beam and binds them firmly together, without perforating or otherwise weakening the beam.

4th, In combination with the post to which the mold board is connected, the bolt, J, or its equivalent, for the purpose of connecting the draft rod at a rigid point in front of the plow post.

5th, In combination with the post, C, and beam, D, the notched flange, E, for the purpose of shifting the position of the said beam in relation to the post, C, so that a team of two or three horses may be used at pleasure.

6th, In combination with the clevis, L, or its equivalent, the eye bolt, M, and washers, N, substantially as and for the purpose set forth.

7th, In combination with the front projection at the top of the plow post and the land side of share, the coulter, Q, or its equivalent, secured to said projection or its equivalent, in front of the clamping stirrup, in order to equalize the upward pressure, substantially as set forth.

8th, The brace, S, in combination with the post, C, and stirrup, G, substantially as and for the purpose set forth.

9th, The stirrup, G, constructed with the horizontal portion, b, to enable the beam to be adjusted sideways, as described and for the purpose set forth.

10th, The share, B, constructed with the land side bar, H, substantially in the manner shown.

78,502.—BUTTER WORKER.—Hosea Willard, Vergennes, Vt.

I claim the rod or spindle, B, with the wings, C and D, connected therewith, in combination with a tray or trough, and operating substantially as and for the purposes herein shown and described.

78,503.—MACHINE FOR FASTENING LACING HOOKS TO GAITERS.—Lewis S. Wiswell, Utica, N. Y.

I claim, 1st, The slides, G and H, constructed substantially as described.

2d, The punch, D, with recess for holding the hooks, constructed substantially as described, in combination with the said slides.

3d, The arms, L, pin, F3, and spring, L', constructed and operating in combination, substantially as described.

4th, The cam, F, lever, C, and punch, D, in combination, substantially as described.

5th, The agitator, constructed and operating substantially as described.

6th, The ways, K K', constructed and operating substantially as described, in combination with the arms, L.

78,504.—HORSE HAY FORK.—Jonathan Wolfrom, York, Pa.

I claim the tines, A, and frame, D, substantially as shown and described, in combination with the points, E, middle time, G, latch lever, d, and slot, i, or the equivalent thereof, all as and for the purpose set forth.

78,505.—CLASP FOR FASTENING GARMENTS.—Wendell Wright, Bloomfield, N. J.

I claim the plates, A B B, connected together by joints or hinges, provided with springs, b b, the plates, B, being provided with spurs or points, all constructed and arranged substantially in the manner as and for the purpose set forth.

78,506.—NEEDLE FOR KNITTING MACHINES.—Walter Aiken, Franklyn, N. H.

I claim the improved knitting machine needle, made with a series of flexures or corrugations, a a a, in its shank, substantially as represented in fig. 1 of the aforesaid drawings, and as hereinbefore specified.

78,507.—ICE HOUSE FOR BREWERS AND BUTCHERS.—Adam Baierle, Frederick Hartmann, and Friedrich Reese, Chicago, Ill.

We claim a building for preserving meats, beer, and similar articles, consisting of the ice chamber, B, and cooling vault, A, provided with one or more ventilators, I, all constructed and arranged substantially as shown and described.

78,508.—SHINGLE MACHINE.—David H. Ball, Sinnamahoning, Pa.

I claim, 1st, The plates, o o, when arranged in relation to the head block, p, and dog, p' p', said dogs being constructed to rest or slide on the plates, as and for the purpose specified.

2d, The block, s, and spring, s', constructed and arranged to operate as and for the purpose set forth.

78,509.—OYSTER DREDGE.—C. T. Belbin, Baltimore, Md.

I claim the combination of the two bolts, m and n, with the ing, o, the rods, A and B, and the head, C, when all said parts are combined and arranged so as to operate together, substantially in the manner and for the purpose set forth.

78,510.—DEVICE FOR OPERATING WATER WHEEL GATES.—Joseph H. Bodine and Truman A. Hill, Mount Morris, N. Y.

We claim the arrangement of the pivoted sector, m, pinion, P, and hand wheel, S, and pivoted connecting rod, n, with relation to the circular register gate, G, whereby said gate is operated horizontally to open and close all the water ways at once, as herein shown and described.

78,511.—CHURN DASHER.—A. H. Brainerd, Rome, N. Y.

I claim, 1st, The head, B, pivoted upon the reciprocating staff, A, and provided with spiral flanges, F, substantially as described.

2d, In combination with the above, the beveled floats, E E', substantially as and for the purpose specified.

78,512.—MACHINE FOR SHAVING SCREWS.—James Burns, New York city, assignor to himself, Richard McCullough, and John Fanning.

I claim, 1st, In combination with the stationary tool, b, and spring guide, Y, the forked lever, U, cam, M, and griping holders, R R, for taking the screw blank from the spring guide, holding, bringing up, and rotating the same against the stationary tool during the operation of shaving the blank-head, and discharging the blank without the aid of a punch, for either feed or discharge of the screw blank, substantially as described.

2d, The combination of the oscillating and reciprocating griping holder carriage, J, cams, K K' N, and spring, O, arranged substantially as and for the purposes set forth and described.

78,513.—CORK EXTRACTOR.—Elijah Button, Annapolis, Md.

I claim the cork extractor consisting of springs having their lower ends adapted to turn on the ring, h, all operating as described, whereby the cork is caged length wise in the bottle, without turning the latter upside down, as herein shown and described.

78,514.—PRESERVING WOOD.—James Calkins, New York city.

I claim, 1st, The employment of steam, in combination with the gases of comonstion generated as described, admitted together into the treating chamber, for the drying of wood and other materials, substantially as set forth.

2d, The process of preparing and treating wood or other material by means of steam and of superheated steam and carbonic oxide, or the gases of combustion, and subsequently treating with the hot oleaginous vapors under pressure while in a highly heated condition from the previous treatment, substantially as described.

3d, The described apparatus, consisting essentially of the generator, A, and its appurtenances, the treating chamber or chambers, Y and K2, tanks, M and L, with their several systems of pipes and cocks, arranged, combined, and operating substantially in the manner and for the purposes set forth.

4th, In combination with the treating chamber or chambers and the generator, the water gage or regulator contained within the dome, M2, or its equivalent, for regulating the pressure of the steam or vapors employed, operating substantially as set forth.

5th, The combination of the pipe, U, with the fire chamber, D, and generating chamber, C, whereby the gases of combustion may be directly admitted into the steam space, substantially as set forth.

78,515.—HARVESTER CUTTER.—Thomas J. Christy, Olney, Ill. Antedated May 25, 1868.

I claim the combination of the chain sections, b, formed with projecting heels, b', for both driving and guiding the blades, a, and links, c, bolted to the sections, b; the pinion, d, driving the chain, through the medium of the projecting heels, b'; the central bar, g, with ledges, g' g', forming guide ways for the heels, b; the finger beam, e, with upturned flanges, e', and the cap plate, f, when the said parts are constructed, arranged, and employed in the manner and for the purpose specified.

78,516.—HALTER BUCKLE.—Francis Ditton, Auburn, N. Y.

I claim, 1st, In combination with three-tongued buckle, the loop, S, for securing the ends of the straps, substantially as described.

2d, The application and use of the said buckle in the manufacture of halters, when the same is constructed and used in the manner above specified.

78,517.—COOKING STOVE.—Wm. Doyle, Albany, N. Y.

I claim, 1st, The construction and arrangement of extension flue, C, in combination with a reverrible or return flue, F, under the oven of a cooking stove, substantially as shown and described.

2d, Flue stopper, B', in combination with flue plates, a, of extension flue, C, when constructed as and for the purpose set forth.

3d, The construction and arrangement of front descending flues, A A, in combination with extension flue, C, substantially as set forth.

4th, The arrangement and combination of front descending flues, A A, cross or connecting flue, H, extension flue, C, and revertible flue, F, substantially as shown and described.

5th, The construction and arrangement of a front descending and direct flue or flues, A A, and cross flue, H, united by extension flue, C, with a revertible flue, F, under the oven of a cooking stove, when all of said flues are operated and controlled by one damper, P, substantially as set forth.

78,518.—VALVE FOR STEAM ENGINE.—Gustav L. Enggren, Brooklyn, N. Y. Antedated May 27, 1868.

I claim, 1st, The valve or piston, D, having a passage, H, or its equivalent, of a valve or slide, L, constructed and operated by the throw of said piston, to effect or regulate the cushioning of the piston at or towards the close of its stroke, but allowing of a free escape for vapor or air on the forward side of said piston, in the early portion of its action, in either direction, essentially as herein set forth.

2d, The combination of the piston, D, with its independent valve or slide, L, operating in connection with exhaust passages as described, and valves, J J', constructed and arranged for action together, substantially as shown and described.

78,519.—BREECH-LOADING FIRE-ARM.—Francis H. Escherich, Baltimore, Md.

I claim, 1st, The construction of the angular pins, g g', of the forwardly projecting part, g, and the downwardly projecting part, g', and operated by the hook, l, of the lever, F, substantially as herein described and for the purpose specified.

2d, The cam, E, provided with projections, g h i, and bulging part, j, in combination with the lever, F, provided with hook, l, and arm, k, substantially as and for the purposes described.

3d, The cam, E, and lever, F, constructed as described, in combination with the hook, n, provided with recess, o, and the hollowed recess, m, substantially as and for the purposes set forth.

4th, The cam, E, lever, F, and hook, n, constructed as described, in combination with the pin, q, provided with a downward projection, q', and secured to the spring, r, and with the hold, p, in the breech, substantially as and for the purposes set forth.

78,520.—LATHE TOOL HOLDER.—C. H. Fowler, Roxbury, Mass.

I claim as an improved tool holding device for metal-turning lathes, etc., the combination and arrangement of the bar, A, screw sleeve or hollow nut, c, and double tapering tube, d, the whole being arranged and operating as herein shown and described.

78,521.—DOOR AND WINDOW CATCH.—S. W. Gear, Whitestone, N. Y.

I claim the two springs, b c, constructed to lock one within the other, as shown and described, and arranged in relation with each other upon the door and frame, substantially as and for the purpose specified.

78,522.—ATTACHMENT TO COOKING STOVE FIRE CHAMBER.—Job Harrison (assignor to himself, George W. Esterly, and C. C. Lewis), Whitewater, Wis.

I claim, 1st, So applying the arch, D, to the fire chamber of the stove that the air chambers, s t, are formed, one between the arch and oven, and the other both back of and above said arch, all in the manner substantially as herein described and shown.

2d, The arch, D, or its equivalent, constructed substantially as described, and applied to a stove for the purpose set forth.

78,523.—CLOTH AND CLOTHES PIN.—Richmond Hathaway, Chicopee, Mass., assignor to himself and Levi O. Allen, Gardiner, Me.

I claim as an article of manufacture, the clothes pin constructed as described, viz., with the central coil, a, the levers, d d, the central depressions to admit the line, and the pointed and ring jaws, all as set forth.

78,524.—FILTER.—Lawrence Holms, Paterson, N. J.

I claim the arrangement of the valves, G H, passages, c d e f, openings, a b a' b', water spaces, i k, and filtering beds, m x, as and for the purposes described.

78,525.—BARBERS' CHAIR.—Charles Kaestner (assignor to himself and Jacob Becker), Chicago, Ill.

I claim a reversible hollow spring seat, provided with the locking bolts, d, levers, G, and handle, D, when constructed and arranged to operate substantially as described.

78,526.—CHURN.—Joseph Kepler, Crawfordsville, Ind.

I claim the device of a single concave breast, with metal points, the convex-concave bottom, B, descending from the elevated breast, C, through the openings, F F, figs. 1 and 2, in combination with perforated top, M, in fig. 4, dash, fig. 3, and scroll top, fig. 6, enclosed in a box, substantially as herein set forth.

78,527.—ARCH OF FURNACE FOR EVAPORATING KETTLE, ETC. Emil Laass, Syracuse, N. Y.

I claim the arch made in section, A A, jointed at the crown by the cylindrical keystone, B, and resting at the spring loosely upon the ways, a a, the whole so arranged that the arch, or either section thereof, can be adjusted bodily in or out, without elevating, and can be readily taken apart, as herein set forth.

78,528.—LAMP CHIMNEY CLEANER.—James Lee, New York city. Antedated May 22, 1868.

I claim the lamp chimney cleaner constructed as described, consisting of the elastic disks, B, secured to the end of the handle A, at right angles to its axis, by means of the screw, C, and provided with the flexible washer, D, as herein shown and described.

78,529.—SHAFT COUPLING.—J. F. Light, Worcester, Mass.

I claim, 1st, The combination of the ends of the shafts, when shaped or cut away and applied to each other, substantially as shown in figs. 2 and 3 of the drawings, so as to prevent the independent longitudinal movement of the one shaft with respect to the other, with holding nuts for encircling and coupling said shafts in the manner herein shown and specified.

2d, The combination with the clasps, B B, of the guide pieces or pins, 2 2, or either, substantially as and for the purposes set forth.

78,530.—SOAP.—O. E. Loomis, Ellenburg, N. Y.

I claim a soap compounded of the ingredients and in the manner herein set forth.

78,531.—SEAT FOR HARVESTER.—W. J. Ludlow, Cleveland, O.

I claim a seat for harvesters, mowing machines, and horse rakes, suspended so as to swing laterally, constructed and arranged substantially as and for the purpose herein set forth.

78,532.—BALANCE.—Louis A. Matos, Philadelphia, Pa.

I claim the adjusting or sliding balance weight, E, in combination with the vernier or graduated arc, and the vibrating weight, which is suspended on an arm which is pivoted to the chord of the arc, substantially as shown and described.

78,533.—SAFETY BRIDLE.—John McKillop (assignor to Andrew Mackey and John Ward, Jr.), Brooklyn, N. Y.

I claim, 1st, The choking apparatus composed of the two lever jaws, constructed and combined for operation, substantially as and for the purpose specified.

2d, The combination of the spring, f, with the two lever jaws, A, of the choking apparatus, substantially as and for the purpose specified.

78,534.—GALVANIC SPECTACLE.—Judah Moses, Hartford, Conn.

I claim the combination with the temples or front of a pair of spectacles, of an electric battery or batteries, so arranged and connected therewith that an electrical current may be caused to pass through the same, substantially as and for the purposes herein specified.

78,535.—BUTTON.—Charles Mudler, Cleveland, Ohio. Antedated May 22, 1868.

I claim the button constructed of two plates or disks, A B, having a rigid connection by means of the shank or pin, C, and the lower disk being shouldered or grooved out so as to form a circular depression, in which the thread used in sewing on the button is buried below the plane of said disk, the whole combined in the manner as and for the purpose set forth, as a new article of manufacture.

78,536.—REED MUSICAL INSTRUMENT.—E. P. Needham, New York city.

I claim the flexible front, c, of the exhaust chamber, A, in combination with the movable reed boards, whereby the requisite movement of the said reed boards is allowed, substantially as herein set forth.

78,537.—RAILWAY TRACK SCRAPER.—S. A. Otis, Boston, Mass.

I claim, 1st, The combination and arrangement of the shoes, B B, sleeves, Q Q, rod, M, and fork, O O, substantially as described and for the purpose set forth.

2d, The combination with the lever, G, in a track-scraping machine, of the foot lever, G' G'', substantially as described and for the purpose set forth.

3d, The combination and arrangement of the lever, L, the link, E, and the rocker shaft, D, made substantially as described and for the purpose set forth.

78,538.—SEED SOWING MACHINE.—John B. Perkins and Al Colburn, Hollis, N. H.

We claim, 1st, The vibrating plow beam, C, held by the spring, E, in combination with the coverer, V, arranged substantially as described and for the purpose set forth.

2d, The agitator, K', arranged and operated substantially as described and for the purpose set forth.

78,539.—LAMP BURNER.—Wm. Robinson, Brooklyn, N. Y.

I claim, 1st, The trough, f, arranged in relation with the openings, b, at the sides of the wick tube, substantially as and for the purpose specified.

2d, The annular trough, D, made detachable, and constructed with the internal flange, whereby it may be fitted between the burner and the lamp substantially as and for the purpose specified.

78,540.—LUBRICATOR FOR STEAM ENGINES.—James Ross, North Cambridge, Mass., assignor to himself and Ferdinand Fairbanks, New York.

I claim the construction in a lubricator of the character herein specified, of the cock, C, and its seat, D, with their openings arranged substantially as described, whereby provision is made for varying the extent of steam condensing surface in the oil cup or reservoir of the lubricator, and thereby regulating the flow of oil or grease, essentially as herein set forth.

78,541.—FEED REGULATOR FOR MILLS.—John Ross, Brooklyn, N. Y. Antedated May 25, 1868.

I claim the use of the feed regulator, A B and J, to close partially or wholly the throat of a conical mill, in the manner described.

2d, The combination of the cone J, with its wings, I, to direct the grain into the throat of the mill.

78,542.—PLOW CLEVIS.—Roger Sandiford, Joliet, Ill.

I claim, 1st, The double segmental clevis, a, when constructed, operating, and arranged substantially as and for the purposes set forth.

2d, The transverse oscillating clevis, e, when constructed and arranged as and for the purposes described.

3d, The combination and arrangement of the segmental clevis, a, and transverse oscillating clevis, e, when arranged, constructed, and operating as and for the purposes set forth.

78,543.—COMPOSITION FOR DEPILATING HIDES.—Peter G. Schlosser, Middletown, assignor to himself and A. P. Baer, Baltimore, Md.

I claim, 1st, the composition, substantially as above described, for depilating dry hides.

2d, The composition, substantially as above described, for depilating green hides.

78,544.—COMPOSITION FOR COVERING ROOFS, PAVEMENTS, WALKS, ETC.—John See, Philadelphia, Pa.

I claim a composition of ingredients herein named, substantially as and for the purposes as specified.

78,545.—PROCESS OF TREATING PETROLEUM FOR THE MANUFACTURE OF LUBRICATING OILS.—Gideon O. Spence (assignor to himself, A. R. Williams, and F. S. Lathrop), Titusville, Pa.

I claim, 1st, The use of the first chemical ingredient herein specified, in the manufacture of lubricating oil from petroleum or coal oil, or their products, for the purpose specified.

2d, The use of the second chemical ingredient herein specified, in the manufacture of lubricating oil from petroleum or coal oil, or their products, for the purpose specified.

3d, The use of the third chemical ingredient herein specified, in the manufacture of lubricating oil from petroleum and coal oil, or their products, for the purpose specified.

4th, The use of the fourth chemical ingredient herein specified, in the manufacture of lubricating oil from petroleum or coal oil, or their products, for the purpose specified.

5th, The use of the fifth chemical ingredient herein specified, in the manufacture of lubricating oil from petroleum or coal oil, or their products, for the purpose specified.

6th, The use of the second and third chemical ingredients herein specified in combination, in the manufacture of lubricating oil from petroleum or coal oil, or their products, substantially as and for the purposes specified.

7th, The use of the five chemical ingredients, herein specified, in combination, in the manufacture of lubricating oil from petroleum or coal oil, or their products, substantially as and for the purposes specified.

78,546.—FISHERMAN'S NIPPER.—Eli F. Stacy, Gloucester, Mass.

I claim, as a new article of manufacture, a moulded elastic gum "nipper," as described, and for the purpose set forth.

78,547.—TELEGRAPH APPARATUS.—Joseph B. Stearns, Boston, Mass.

I claim, 1st, In an electro magnet coil, constructed of two opposing or neutralizing conductors, making each of the conductors of the same length, and giving them each an equal number of turns, as and for the purpose set forth.

2d, A key or other circuit breaker, the back stop of which is connected with the ground by a wire, in which is placed a rheostat or other resistance, and for the purpose set forth.

3d, Combining an electro-magnet constructed as described, or in any other manner, to produce either complete or partial neutralization of its cores, with a key or circuit breaker having a connection between the back stop, or its equivalent, and the ground, through a rheostat or other resistance, as and for the purpose described.

4th, Combining an electro-magnet constructed as described, or in any other manner by which either a complete or partial neutralization of its cores is produced, with a key or circuit breaker having no connection between its back stop and the ground, as specified.

5th, In combination with an electro-magnet constructed substantially as described, the key, A, the key or circuit breaker, C, local battery, B, and rheostat, F, all constructed and operating substantially as and for the purpose set forth.

78,548.—TELEGRAPH APPARATUS.—J. B. Stearns, Boston, Mass.

I claim, 1st, The combination of a relay consisting of two electro-magnets, so arranged as to act upon the same armature post, in opposite directions, with a key that shall close one circuit before or at the same time that it opens another, when the same are constructed and made to operate substantially as described.

2d, The combination of the relay constructed substantially as described, the sounder key, S, and rheostat, R, when the whole are connected and made to operate substantially in the manner and for the purpose set forth.

3d, In combination with the rheostat, R', the double relay, when the latter is so constructed as to effect the finer adjustments of the forces acting upon the armature or armatures, as set forth.

4th, So arranging the several parts of the apparatus that the resistance offered to the current from the battery at either end of the line is always the same, whatever may be the position of the key at the opposite end.

5th, In combination with the key, S, constructed as described, the rheostat R', inserted between the key and the ground, substantially as and for the purpose described.

78,549.—FRUIT DRYER.—Alden S. Stevens, Attica, N. Y.

I claim the combination of the hollow cylinder, A, open at both ends, and provided with cutting teeth, a1, at its upper edge, with the conducting bag, F, attached to its lower edge, and manipulating rod or pole, C, connected to its side, as and for the purpose set forth.

78,550.—AX HANDLE.—Benj. D. Stevens, Decorah, Iowa. Antedated May 18, 1868.

I claim, 1st, Inserting india rubber or similar elastic substance in the eye of axes, hammers, and analogous tools, when placed in the position for the purpose substantially as described.

2d, The wedge, C, when constructed and used as and for the purpose set forth.

78,551.—LIQUID METER.—James Sutherland, Brooklyn, N.Y.

I claim, 1st. A liquid meter composed of two or more cylinders fitted with independent pistons, when these latter are controlled by valves operated so that either one piston or connected pair or set of pistons is or are made to actuate the valve which controls the other piston or connected pair or set of pistons, substantially as specified.

2d, The combination of the cylinders, C C' and D D', with their pistons and valves, so arranged and operating as that either one set of pistons to said cylinders are reversed in their action by the motion of the valves which control them, when the other set of pistons are midway of their stroke, or thereabouts, essentially as herein set forth.

3d, The combination of the cylinders, C C' and D D', with their pistons, yokes, H H', tappets, L L', arms, M M', and valves, J J', for operation together, and in connection with suitable inlet and outlet passages, substantially as shown and described.

78,552.—WAGON FOR ADVERTISING.—George W. Thompson, New York city. Antedated May 25, 1868.

I claim, 1st, The employment of the vertically arranged revolving drum of advertisements or signs, substantially as and for the purposes herein shown.

2d, The arrangement of the pulley, J, with the guide pulleys, L L, and the pulley, I, for transmitting motion to the axle, F, substantially as and for the purpose stated.

78,553.—TURN TABLE.—James K. Thompson (assignor to himself and Wm. B. Howard), Chicago, Ill.

I claim, the bearing frame, G, consisting of bearing circle, H, cross beams, k k, and trussed bearing beams, M M, each of the above said parts constructed as described, and the whole arranged and operating substantially as and in the manner herein set forth and specified.

78,554.—MACHINE FOR MAKING TREENAIL.—Nathaniel L. Tomlinson, New York city.

I claim the combination of the slotted slide, b, holding the adjustable knife a, the movable gage rest, g, its connecting rods, l l, sliding screw, h, the two screw wheels, c and s, with the gage disk, k, constructed and arranged substantially as hereinbefore described.

78,555.—SAUSAGE STUFFER.—John P. Troxell (assignor to himself and Samuel H. Davis), Hancock, Md.

I claim the single discharge opening for the cylinders, A A, valve, E, and hollow journals, a a, combined and operating substantially as and for the purpose set forth.

78,556.—VALVE AND STEAM PASSAGE.—George Verry (assignor to himself and O. G. Graves), Norwich, Conn.

I claim, 1st, The arrangement of the receiving and exhaust ports B B' C C', and cut-off plugs, E E, substantially as herein described.

2d, The recesses, A A', in combination with the ports, B B' C C', substantially as and for the purpose described.

78,557.—TIDE MOTOR.—Wm. W. Virdin, Baltimore, Md.

I claim, 1st, A floating vessel or buoy, B, constructed with water passages through it, and provided with a cut-off, B', and a water wheel, D, said buoy being arranged in a suitable passage way for water, in such manner that the wheel will be caused to turn both by the ebb and flow of the tide, substantially as described.

2d, The buoy, B B', constructed with bulkhead apartments, substantially in the manner and for the purposes described.

3d, The chamber or chambers, J', in combination with a boy, B, having an aperture or apertures, l l, and constructed substantially as described, for the purpose of receiving water to be raised by the elevator, J, substantially as described.

4th, The endless chain of double chambered buckets, in combination with a perforated drum, G h i, substantially in the manner and for the purposes described.

78,558.—CIDER AND WINE MILL.—James Walton, Sunfish, Ohio.

I claim the arrangement of the hoppers, P Q, grinding rolls, B B', apron, F, rolls, G G' G'' I I', incline, M, concaves, N and O, and receiver, R, substantially as and for the purpose set forth.

78,559.—APPARATUS FOR DYEING.—Miles Waterhouse, Passaic, N. J.

I claim the combination and arrangement of the several parts, substantially as and for the purposes shown and described.

78,560.—ICE CREEPER.—William C. Wells, Philadelphia, Pa.

I claim a "creeper" composed of a piece of leather or other soft material, with metal "spurs" fastened thereon, by means of metal "washers," and by riveting, when said piece of leather, with spurs thereon, is constructed separate from the shoe, and is intended to be worn beneath the sole of the shoe, and is attachable to and detachable from the shoe, substantially as shown and described.

78,561.—HOE.—Isaac N. Wood, Fall River, Mass.

I claim the improved hoe as made with the short, open, tubular blade, combined or provided with an angular nose, arranged with respect to such blade and its shank, substantially as specified.

78,562.—MANUFACTURE OF TABLE WARE.—Howell W. Wright (assignor to Reed & Barton), Taunton, Mass.

I claim, 1st, The within-described alloy of nickel and copper, or any other substantially the same, all as and for the purposes set forth.

2d, The improved table ware, made substantially as described.

78,563.—CARRIAGE SEAT.—John H. Adams, Portland, Me.

I claim, 1st, The swinging hinged or pivoted bar, b, either with or without the studs, h, in combination with the projection, e, the said bar, b, being attached, as set forth, to the carriage sides, and capable of being fastened thereto, as set forth, and the projection, e, to the carriage seat, as and for the purposes described.

2d, The clamp, l, in combination with the projection, e, on the seat, as and for the purposes described, the said clamp, l, being secured as herein set forth.

78,564.—CONSTRUCTION OF SHEET METAL CONDUCTOR PIPE.—William Austin (assignor to himself and William Opdyke), Philadelphia, Pa.

I claim a water conductor or pipe, made of corrugated sheets of metal, so as to yield to the internal pressure caused by the freezing of the water therein, substantially as described.

78,565.—VISE.—Quimby S. Backus, Winchendon, Mass.

I claim the method of protecting the screw shafts of vises with the sectional tubes, h i and k, arranged and operating substantially as described.

78,566.—HAY LOADER.—Addison Barker, Camanche, Iowa.

I claim the drum, F, arranged outside of the wheel, G, in combination with the sheaves, C and O, and stop, L, for taking in the slack of the rope, B, essentially as shown and described.

78,567.—TOY.—John H. Barnes, Troy, N. Y.

I claim the combination, in a toy whistle, of the flanges, a' and a'', with a cord and ring fastened by a loop, or equivalent, substantially as described and for the purpose specified.

78,568.—HARNESS BUCKLE.—Alma Bedford, Coldwater, Mich.

I claim a harness buckle, provided with the cross bar, E, and loop, D, when constructed as herein described, as a new article of manufacture.

78,569.—COMPOSITION FOR DESTROYING INSECTS IN FRUIT TREES.—Benjamin Best, Dayton, Ohio.

I claim the mode of protecting trees, by the application of the hereinbefore described composition to bands of fibrous material surrounding the trees, substantially as described.

78,570.—CAR SEAT AND CHAIR.—William N. Bragg (assignor to himself, W. H. Trainham and J. B. Winston), Richmond, Va.

I claim, 1st, The combination of the arm, A, with the bars, A1 and A2, and rock shaft, a3, and the belt crank, C1 and rod, c, to operate toe pawl, C, substantially as and for the purpose specified.

2d, The combination of the above parts, A A1 A2 a3 C1 c and C, with the hook, b, of the leg, with the notched plates, d1, for the purpose specified and as substantially described.

78,571.—SHAFT COUPLING.—Levi Bronson (assignor to himself and James Brayley), Buffalo, N. Y.

I claim the guard flanges, C C, of the ring, A, in combination with the forked shafting, E, headless bolts, D D, held by keys, p p, the whole arranged as described and operating in the manner and for the purpose set forth.

78,572.—MODE OF CONSTRUCTING IRON POSTS FOR RAIL FENCES.—Henry S. Brooks and Jacob S. Lehmen, Martickville, Pa.

We claim the intervening rail supports, c, with their perforated flanges, x, in combination with the two round iron sides, A A', top and bottom plates, d d', and bed plate, B, all arranged and applied in the manner and for the purpose specified.

78,573.—TELEGRAPHIC REPEATER.—W. G. Bronson, Wellsville, Ohio.

I claim, 1st, So combining the local circuit, influencing and operating a registering, repeating, or signal instrument in an electro-magnetic telegraph system, with a receiving or relay instrument on a main circuit in said system as that said local circuit shall stand open when the main circuit is closed, and *vice versa*, all substantially in the manner and for the purpose herein set forth.

2d, An electro-magnetic telegraph relay or receiving instrument, so constructed as that the contact of its armature lever with a suitable connecting conducting point to close a local circuit, shall be broken, and the local circuit thereby opened when the receiving magnet becomes excited, all substantially in the manner and for the purpose herein set forth.

3d, The combination and arrangement of the armature lever of a telegraphic repeating instrument with the wires of the local circuit, and a connecting and conducting post in said circuit, so as that the local circuit shall be closed through said lever and post when the magnet attracting said lever is inactive, all substantially in the manner and for the purpose herein set forth.

4th, So combining the connecting device in a repeating instrument, whereby the main circuit is closed, with an insulated pin upon the armature lever thereof, as that said main circuit shall be opened when the magnet of the instrument is excited, all substantially in the manner and for the purpose herein set forth.

5th, The improved connecting and conducting post, M, in my repeating instrument, when constructed with a horizontal arm, s, carrying an adjusting screw and connecting pin, r, and combined with an elastic metallic strip, p, from a second conducting post, L, to open and close an electrical circuit, all substantially in the manner and for the purpose herein set forth.

6th, The telegraphic switch, P, constructed of an insulated pivoted plate, provided with metallic strips, each so disposed thereon as that, by a proper adjustment thereof, a connection may be formed thereby between any two detached pins or points beneath the plate communicating with the wires of electro-magnetic batteries, to be broken by turning the plate upon its pivot, so as to change the alignment, all substantially in the manner and for the purpose herein set forth.

7th, My improved key or circuit breaker, so constructed as that, when at rest, the main circuit connected therewith shall be closed thereby through its lever, its base plate, and an insulated anvil, substantially in the manner and for the purpose herein set forth.

78,574.—PADDLE WHEEL.—James Burson, Yates, Ill. Antedated May 25, 1868.

I claim, 1st, The plates or carriers, h, for holding the guide rods, D F, in four angular positions, in combination with the ways, L N U W and J K Y M, all arranged and operating substantially as shown and described.

2d, The combination of four guide rods to either bucket, with separate rails or tracks to either pair of said rods, for operation together, substantially as and for the purpose or purposes herein set forth.

78,575.—CLOTHES DRYER.—J. M. Butters, North Fryeburg, Me.

I claim the combination of the bars, D D', with brackets, A and A', pivots, d d, and projections, a a, and back, B, the whole constructed as described and operating as set forth.

78,576.—DIE FOR MAKING AXLE NUTS.—A. B. Caldee, Hamden, and L. S. Taylor, Southington, Conn., assignors to Ætna Nut Company.

We claim the combination of the cut-off block, K, griping dies, F and H, die, L, and punch, a, all constructed, arranged, and operating in the manner substantially as described.

78,577.—SPOOL GUARD.—W. C. Cleveland, Cambridge, Mass.

I claim the spool guard, C, provided with projections, a, so constructed as to clamp the spool between them, and to serve as axles for the spool to rotate upon, substantially as herein set forth.

78,578.—GAS BURNER.—Seth L. Cole, Brooklyn, N. Y.

I claim adjusting the cap, A, upon the jet or burner by means of the cogged bar, c, and ratchet wheel, d, or a section thereof, or by any device that will cause the cap to move up or down, by simply turning the stop cock, B, which regulates the flow of gas to the jet or burner, for the purpose substantially as described and shown in the drawings.

78,579.—THILL COUPLING FOR CARRIAGES.—Monroe M. Copp, Albion, N. Y.

I claim the convex-headed cap, C, provided with the square shoulder, b, and screw nut, k, said head being recessed to receive one half of the draw bolt, h, and form, with the recess of the bar, A, a complete eye, and a shield to exclude dust from the same, in combination with the forked thill iron, B, and jack, A, arranged and operating substantially as and for the purposes set forth.

78,580.—FOOT LIGHT FOR THEATERS.—Coleman Defries, London, Great Britain.

I claim the exclusive use of an improved foot light, constructed and arranged substantially as herein described, and shown on the accompanying sheet of drawing, whether the mechanism for raising and lowering colored mediums be or be not applied thereto.

78,581.—MANUFACTURE OF TOE CALK AND BLANK FOR THE SAME.—Thomas Dooley, South Boston, Mass.

I claim a calk or calk blank having a relative disposition of iron and steel, produced and shaped substantially as described.

78,582.—SIDE GEAR FOR THRASHING MACHINE.—John Duchesne, Lacon, Ill.

I claim, 1st, The swiveling post, k, for the purpose of rendering the connection between a horse-power and separator adjustable, substantially as described.

2d, The combination of the swiveling post, k, spring arm, m, and notched foot plate, h, as and for the purpose set forth.

3d, The combination of the swiveling post, k, with the gearing, l l c d and shaft, s, as and for the purpose set forth.

4th, The cap, n, in combination with the gearing, c d, as and for the purpose set forth.

5th, The slotted case, o, in combination with the gearing, l i, and swiveling post, k, as and for the purpose set forth.

78,583.—STREET SCRAPER.—Abraham Dyson, St. Louis, Mo.

I claim, 1st, The wheels, f f' and N, blocks, e e' e'' e''', shafts, d d', and frame, D, with their connecting chords, x x', and elastic bands, i i' i'' i''', of a street scraping machine, all arranged relatively to each other and the rest of the machine, substantially as and for the purpose shown and specified.

2d, The lever, O, with its arm, v, link, s, frame, D, and cam, r, of a street-scraping machine, all arranged relatively to each other and the remaining parts of the machine, substantially as and for the purpose shown and specified.

3d, The combination of the scrapers, 1 2 3 4 etc., and h h', with the frames, D E and F, all constructed, arranged, and operating substantially as and for the purpose shown and specified.

4th, A street-scraping machine, combining the devices above mentioned, when constructed, arranged, and operating substantially as and for the purpose shown and specified.

78,584.—CHIMNEY CLASP.—C. F. Espick, Plymouth, Ind.

I claim the sections, A and B, constructed substantially in the manner specified, of any required size, and bound together around the upper end of a chimney, as and for the purpose set forth.

78,585.—DIE FOR CUTTING THE TEETH OF METALLIC COMBS.—Caleb Foster (assignor to Elias Brown), Wappinger's Falls, N. Y.

I claim the combination of the male and female dies, A B, follower or plunger, D, spring, E, or its equivalent, and the cutting lips, b b, on the male die, all arranged for joint operation substantially in the manner as and for the purpose set forth.

78,586.—BREAD KNIFE.—John Frisch, Albany, N. Y.

I claim, 1st, The employment of roller, B, when arranged to regulate the thickness of the slice, and also to yield to the pressure of the knife, substantially as and for the purposes described.

2d, In combination with the above, spring, m, bars, B C, slides, g g, and roller, b, all arranged substantially in the manner and for the purpose set forth.

78,587.—CULINARY VESSEL.—Chauncey W. Fuller, Earlville, Ill.

I claim, in combination with the boiler, A, diaphragm, B, and cover, D, the vessels, C C, and perforated plate, E, when so constructed and arranged that the drip from the condensed steam shall fall outside of and not into the vessels, substantially as described.

78,588.—COOKING APPARATUS.—J. M. Gale and I. M. Avery, New York city.

We claim, 1st, The construction of the diaphragm, C, consisting of the concave and conical disks, c f, alternately perforated, and connected as described substantially as set forth.

2d, The combination of the removable diaphragm or diaphragms, C, with the cylinder, A, and lugs, l l, substantially as and for the purposes set forth.

78,589.—CHURN.—A. E. Gillilan, Marian, Iowa.

I claim the dashers, E E, and adjustable slotted board, B, as constructed in combination with arms, f f g g, and crank shaft, D, when all are arranged and operated as and for the purpose set forth.

78,590.—WAGON SEAT.—Lewis Graham, Plymouth, Ill.

I claim the levers, B B, slotted and hinged at their inner ends to the wagon seat, A, with the stationary headed bolts, E E, and tubular rubber springs, D D, arranged and used as and for the purposes set forth.

78,591.—COMBINED SQUARE AND CALIPER.—C. W. Guerrant, Leakville, N. C.

I claim the combination of the bars, A and B, and slotted arm, C, arranged and operating as described for the purposes set forth.

78,592.—CEMENT FOR FASTENING DOOR KNOBS, AND FOR other Purposes.—N. B. Hall and Herbert Jones, (assignors to Thomas Kennedy), Brantford, Conn.

We claim the cement, produced by the combination of materials and in the proportions herein fully set forth and described.

78,593.—WASHING MACHINE.—Sanford V. Hall, McGrawville, N. Y.

I claim the spiral springs, g g, the grooved side gages, h h, and the cap piece, f, in combination with the fluted roller, e, and rub board, a, all constructed and operated substantially as described.

78,594.—LUBRICATOR.—Timothy Holland and J. T. Cody, Cincinnati, Ohio.

We claim the combination and arrangement, substantially as described, of the globe, A a, socket, B, tubular stem, C c I D, chamber, H h, and valve F G g, as and for the purpose set forth.

78,595.—OVER SHOE.—H. L. Hotchkiss (assignor to L. Candee & Co.), New Haven, Conn.

I claim the application of the binding, a, to the shoe, and so as to protect the edge of the fabric, in the manner and for the purpose substantially as specified.

78,596.—STILL FOR SPIRITS.—Gottlob Kaiser (assignor to himself and Vossnack & Steins), New York city.

I claim, 1st, The within-described combination of two stills with the mash heater, and rectifier, and column, and defecator, and a condenser, connected and arranged for joint operation, substantially as and for the purposes herein set forth.

2d, In connection with the above, introducing the mash into the mash heater gradually or by small increments so as to maintain a uniform or nearly uniform temperature in the heating vessel, substantially as and for the purpose herein specified.

3d, In a mash-heating vessel, B, constructed and arranged substantially as herein specified, the within described provision for agitating the contents, by the injection of steam into the same, in the manner and with the advantages herein set forth.

4th, Cooling the dephlegmator with water from the condenser, by means of connections and cocks, arranged as shown, so that the cold water is economized, and the cooling of the dephlegmator is gradual and uniform, all as and for the purposes herein set forth.

78,597.—SHOE FOR SEPARATOR.—Michael Laufenburge, Two Rocks, Cal.

I claim the combination of the screw, I with the two inclined sleves, C and C', vibrating in alternation, substantially in the manner and for the purposes herein described.

78,598.—GATE.—John Lee, Massillon, Ohio. Antedated May 27, 1868.

I claim, 1st, The blocks or revolving fulcra, d' d', and hinged fulcrum, b, attached to top rail, B, of gate, and hand levers, d d, when used in combination with the same, constructed and operating as described and for the purposes set forth.

2d, The sliding latch, F, and inclined plane, l, and rope, a, for locking and unlocking the gate, constructed as described, and operating as set forth.

3d, The weight box attached to rail, B, and operating in slot, f, on pivot bolt, e, constructed as described and operating as set forth.

4th, The sliding pivot and guide blocks, i i, for keeping the gate in a vertical line while being operated, constructed as described and for the purposes set forth.

5th, The levers, a' a', with slots, m, and concave or convex ends, and convex or concave in post, A, to correspond, constructed and operating as described and for the purposes set forth.

78,599.—TOOTH BRUSH.—Thos. Maitland, Williamsport, Pa.

I claim the hollow head, B, and its bristles, made of india rubber, and combined with the handle, A, having a tenon on its end, all constructed and used substantially as specified.

78,600.—APPARATUS FOR GENERATING GAS.—R. J. Malcolm, Cincinnati, Ohio.

I claim, 1st, Carbureting air by reversing the vessels or chambers, x and z, substantially as described.

2d, The combination of vessels or chambers, x and z, so that as the compound vessel is revolved or reversed, air is drawn in and forced out alternately, as described.

3d, The valves, f f' g g' h h' I I', in combination with their respective pipes when used as set forth.

4th, The floats, d d', and cross bar, C', or its equivalent, as specified.

5th, The combination of the cylinder, A, frame, B, and floats, d d', when operating as and for the purpose specified.

78,601.—COMPOSITION TILE OR SLAB FOR FLOORS, ETC.—I. Marsh, Jr., Milton, Pa.

I claim a composition tile or slab for pavements, etc., consisting of the composition surrounding and supported or strengthened by an interior platform or framework, substantially as described.

78,602.—PUMP.—C. S. McMahan, Centerville, Ind.

I claim the piston, P, in combination with valves, C and d, when the latter are provided with hoisting appendages, as described, and the whole arranged and operating substantially as and for the purpose set forth.

78,603.—BREECH-LOADING FIRE-ARM.—Samuel Norris, Springfield, Mass., and Wilhelm Mauser and Paul Mauser, Oberndorf, Wurtemburg, assignors to Samuel Norris.

We claim, 1st, The combination of a main spring, k, formed substantially as herein described, with the handle of the breech block, C, and arranged to propel the firing pin or other striking device of a breech-loading fire-arm substantially as and for the purpose herein set forth.

2d, The sliding block, C, handle, ), spring, k, and catch, m, of a breech-loading gun, constructed, combined, and operating in such manner that the piece is cocked by turning the said handle, substantially as herein set forth.

3d, Securing the breech block, C, by means of the recess, k3, and catch, m, substantially as and for the purpose herein set forth.

78,604.—WEIGHING SCOOP.—J. K. O'Neil, Kingston, N. Y.

I claim, 1st, The hollow handle, B, to the scoop, for the purpose of receiving the balance, D, substantially as herein set forth.

2d, Securing the balance to the handle when not in use for weighing, substantially as specified.

3d, So shaping the balance that it will form a counterpart to the handle, and compose part of it when brought down thereto, substantially as described.

4th, The arrangement of the notches, c c, or their equivalent, upon the scoop, in relation to the bail and balance, substantially as and for the purpose set forth.

5th, Attaching the balance to the scoop bail by the extension of the balance spring itself, as herein specified.

6th, The combination and arrangement of the weighing rack, t, swivel shaft r, pin, s, and the balance spring, substantially as and for the purpose herein set forth.

7th, The elastic washer, n, around the index pivot, and pressing upon the index, substantially as and for the purpose herein specified.

7th, The elastic washer, n, around the index pivot, and pressing upon the index, substantially as and for the purpose herein specified.

8th, The combination of the adjustable dial and adjustable index to be used together for making double or successive adjustments, as specified.

78,605.—MANUFACTURING FRUIT-CAN BODIES.—Jacob Pfau, Cincinnati, Ohio.

I claim, 1st, The mode of manufacture of a creased and open-mouthed fruit can body in one piece, substantially as described.

2d, An open-mouthed and creased fruit can, whose body and the shoulder for receiving the wax are formed of one piece, in the manner set forth.

78,606.—REFRIGERATOR.—Enoch Piper, Camden, Me.

I claim, 1st, A refrigeratory apparatus, one or more of the inner walls of which are deep, narrow vessels of thin metal, to receive the freezing mixture, substantially as described.

2d, The employment, in a refrigeratory apparatus, of one or more receptacles, B D, for the freezing mixture, constructed of thin metal, in the form and proportions substantially as shown and described, to serve as partitions between the sides, as constructed.

3d, The combination of the shelves, F F, open at the sides and top, and having a bar across the top, substantially as described, with a refrigeratory chamber, C, formed substantially as described.

78,607.—LAMP BURNER.—A. H. Platt, Philadelphia, Pa.

I claim the combination and arrangement of the concentric wick tubes or plates, 2, 3, with open spaces, b b, therein, the movable wick regulator, 4, perforated plate, k, and apron, a, substantially as and for the purposes herein specified.

78,608.—HANGER FOR SHAFTING.—John Richards, Cincinnati, Ohio.

I claim, 1st, The stem, C, formed to receive the lugs, d, substantially as shown.

2d, The combination of the adjusting screws, h h, and eye bolt, E, when used substantially as herein shown and for the purposes specified.

3d, The cylindrical screw piece, o, for adjusting the box, when formed to receive the bolt, E, in the manner and for the purposes described.

4th, The screws, h h, in combination with the stem piece, C, for adjusting the box, S, as herein shown and for the purposes specified.

5th, The stem piece, C, screw piece, o, eye bolt, E, and screws, h h, combined and operating substantially in the manner and for the purpose specified.

78,609.—CARRIAGE THILL.—Benjamin Robinson, Thomaston, Me.

I claim the arrangement of the cap, e, upon the projection, a, the said cap being secured by bolts, 1 and 2, in conjunction with the rubber piece, f, the rigid bolt of the shaft, the sides, 3, of the forked end of the shaft, the projection, h, and either with the elastic strip for the two purposes, of rendering the shaft holder adjustable and the shaft self-supporting, as described.

78,610.—COMPOSITION FOR PREPARING PAPER FOR TRANSFERRING STAMPS AND OTHER PRINTED MATTER.—MAX Rosenthal, Philadelphia, Pa.

I claim a chemical compound, composed of the ingredients mixed in the proportions and quantities, and applied to unsized paper, as herein described and for the purpose set forth.

78,611.—HOE.—C. W. Saladee, Newark, Ohio, and J. S. Hall, Pittsburgh, Pa.

We claim the lips, w x and y, when formed substantially as described, as part of the hoe blade, in combination with the brace, B, substantially as and for the purposes set forth.

78,612.—GRATER AND SLICER.—C. W. Saladee, Newark, Ohio, and J. S. Hall, Pittsburgh, Pa.

We claim, 1st, The frame, A, table, B, and crank, D, substantially as described, in combination with the grater, G, substantially as and for the purposes set forth.

2d, The frame, A, table, B, and crank, D, substantially as described, in combination with the slicer, S, substantially as and for the purposes set forth.

The hollow plug, e, in combination with the holder, E, in the manner and for the purpose substantially as shown and described.

78,613.—COMPOSITION FOR FILLING THE PORES OF WOOD FOR VARNISHING.—Jacob Sheller, Wilmington, Del.

I claim the combination of the within-named ingredients, when mixed in the several quantities and proportions as herein described and for the purpose set forth.

78,614.—COTTON-SEED PLANTER.—Bryan Smith, Falkland, N. C.

I claim, 1st, The cylinder, B, constructed with arms, C, and pins, E, substantially as and for the purposes set forth.

2d, In combination with the cylinder, B, the coverer, K, constructed and operating substantially as specified.

3d, A cotton planter, having cylinder, B, cover, K, and plow, G, constructed and operating substantially as and for the purposes described.

78,615.—PRUNING SHEARS AND KNIFE.—John Spear and J. A. Hull, Carbondale, Ill.

We claim, 1st, The shears, consisting of the double curved blade, C, the blade, B, with the projecting thrust cutting edge or chisel, G, and the curved edge, D, arranged as described.

2d, In combination with the pruning shears herein described, the clasp, figs. 3 and 4, constructed and operating substantially as specified.

78,616.—CUTTER HEAD FOR PLANING MACHINES.—Albert T. Stearns, Dorchester, Mass.

I claim the combination of the slotted screw bolt with the cutter head and side cutters, constructed and arranged substantially as set forth.

Also, the cutter-head, constructed with the side cutters, arranged relatively to the center cutters, substantially in the manner and for the purpose set forth.

78,617.—EAVES TROUGH.—Wm. Stine, Elmore, Ohio.

I claim, 1st, The construction and arrangement of the bars, e and f, and cross bar, a, for holding an eaves trough, substantially as described.

2d, In combination with the above, the wire, b b, as and for the purpose set forth.

78,618.—MOP WRINGER.—D. J. Stone, Warwick, R. I.

I claim, 1st, The combination of the rolls, apron, and rod for operating the same, when arranged as herein set forth and for the purpose specified.

2d, The combination of the rolls, C F, and plates, x, as herein set forth and for the purpose specified.

78,619.—ELECTRO MAGNETIC ENGINE.—L. C. Stuart, New York city.

I claim, 1st, In the employment of a series of rotary magnets, arranged in pairs, and so connected that the magnetization of one set of magnets is effected before the demagnetization of the other, substantially as and for the purpose as described, in combination with a series of stationary magnets, when arranged and operating in the manner substantially as hereinbefore described for the purpose set forth.

2d, Alternately energizing and demagnetizing the electro magnets, without breaking the connection between the poles of the battery, in the manner hereinbefore described.

3d, Conveying the induced or secondary current from the magnets as they are demagnetized, along with the current running to supply another set of magnets, substantially in the manner herein described for the purpose set forth.

4th, The employment of a series of adjustable conductors, substantially as described, whereby the speed and draft of the engine may be governed at pleasure, as hereinbefore set forth.

5th, The combination of the disks, a and b, and the conductors, e f g and h, when arranged and operating substantially as described.

78,620.—BENCH HOOK FOR CARPENTERS' BENCH.—Samuel Swan, New York city.

I claim the bed plate, E, constructed substantially as described and fitted with a hinged tongue, actuated by a spring, as set forth.

78,621.—BEEHIVE.—Homer Tuller, Ash Grove, Ill.

I claim, 1st, The box, or hive, A, constructed substantially as described, when used in combination with the honey boxes, B, as and for the purpose specified.

2d, The honey boxes, B, having the top side made of glass, and a series of slats at the bottom and one end, hinged in the manner substantially as and for the purpose set forth.

78,622.—MODE OF CONSTRUCTING LOOSE PRAIRIE FENCES.—Izaak Van Kersen, Kalamazoo, Mich.

I claim constructing a fence with wheels and axles permanently attached to one end of each panel, while the other end is connected by hooks and eyes, and the panels supported by braces, D D, the whole constructed, arranged, and operated substantially as and for the purpose set forth.

78,623.—MACHINE FOR GRINDING THE CUTTERS OF MOWING MACHINES.—Smith D. Wackman, Auburn, N. Y.

I claim, 1st, The combination, substantially as set forth, with a grindstone, of an oscillating adjustable clamping frame, suspended from overhanging arms, for the purposes set forth.

2d, The combination, substantially as set forth, with the frame, A, of the vertical detachable turning posts, G, the overhanging slotted brackets, H, the journals, the swiveling suspension rods, and the clamp bar, for the purposes specified.

3d, The combination, substantially as set forth, of a supporting frame, a bed plate turning on a pivot on said frame, a grindstone mounted on and turning with said bed plate, an adjustable overhead supporting frame, and a suspended oscillating clamping frame, for the purposes specified.

78,624.—GRINDING MILL.—A. H. Wagner, Staunton, Va.

I claim the spider, V, the rollers, U W, the inclines, X X, the rod, Y, and nut, a, when arranged and operating in the manner and for the purposes specified.

78,625.—WATER ELEVATOR.—Alvah Walker, Oswego, N. Y.

I claim the curb, C, pulley, G, pulley or pulleys, H, and cord, F, arranged horizontally, with the fastening, I, all combined and arranged substantially as and for the purposes described and shown.

78,626.—CULTIVATOR.—William Walton, East Palestine, O.

I claim attaching the handles, D, directly to the wings, B, and providing an adjustable brace in the curved bars, H, in the manner and for the purpose substantially as herein set forth.

78,627.—COUNTER SHAFTING.—H. C. Weihe, Philadelphia, Pa.

I claim, 1st, The parallel counter shaft, B B', sliding spur wheel, H, fixed pinion, I, and the loose cone pulley, E, when combined and arranged substantially as shown and described.

2d, The parallel counter shaft, B B', fixed pulley, G, loose pulley, F, sliding feather, a, collar, b, shifting lever, K, and the loose cone pulley, E, when combined and arranged substantially as shown and described.

3d, The parallel counter shafting, B B', loose pulley, F, fixed pulley, G, sliding feather, a, loose cone pulley, E, feather, c, sliding gear, H, and the pinion, I, when combined and arranged substantially as shown and described.

4th, The main shafting, A, parallel counter shafting, B B' pulley, C, pulley, D, loose cone pulley, E, feather, a, loose pulley, F, and the fixed pulley, G, when combined and arranged as herein shown and described.

78,628.—CURTAIN FIXTURE.—George M. White and Charles S. Meeker, New Haven, Conn.

We claim the lever, K, constructed so as to receive the cord, and permit its free passage therethrough while in a depressed position, or hold the cord, as the case may be, substantially as herein set forth.

78,629.—ELECTRO-MAGNETIC ENGINE.—William Wickersham, Boston, Mass.

I claim, 1st, In electro-magnetic engines, the arrangement of the magnetic bars in an endless chain, having alternate magnetic bars and links of non-magnetic metal, the chain being so arranged in the engine that all the magnetic bars can pass successively through the same helix or column of helices substantially as described, and for the purpose set forth.

2d, In electro-magnetic engines, the construction of two chain gears on parallel shafts, of suitable form and distance apart to receive the electro-magnetic chain, all arranged in such manner that the gears and chain can revolve together, substantially as described.

3d, In electro-magnetic engines, the arrangement of two or any desirable number of chain gears on the same shaft, with the corresponding number of electro-magnetic chains, all working concurrently together and communicating their power to the same shafts, substantially as described, and for the purpose set forth.

4th, In electro-magnetic engines, out of a thin ribbon shaped strip of metal, the formation of two or more helices, as described, and so arranging them in the engine, in columns or otherwise, that each shall receive a different series of magnetic bars through it, and so further arranging them that when the circuit is closed through one helix, it shall be closed through all of the series thus formed of said strip, substantially as described.

5th, The circuit cylinder, with its spiral conductors so formed and in such connection with the helices, that it shall continue the same relation between the closed circuits and the position of the magnetic bar, or as near as may be, as it advances through the column of helices.

6th, Such disposition of these spiral conductors around said circuit cylinder that one of them will perform the same function for each magnetic bar as it enters a column of helices, or for all the magnetic bars of a series which enter a series of said columns at the same time, substantially as described and for the purpose set forth.

7th, Such an arrangement of the spiral conductors, e e e, on the sides of the cylinder, in combination with its movable arrangement on its shaft, as will close the circuits in such manner in its middle position that there will be no tendency of the magnetic bars to move in either direction, and will open the circuits in such manner in its upper and lower positions as will give motion to the magnetic bars, but in diverse directions, the upper position in one direction, and the lower position in the opposite direction, substantially as described and for the purpose set forth.

8th, In combination with the cylinder, the device, consisting of the sliding bar, o, and the spring, q, for moving the circuit cylinder to and holding it in any position needful to stop the engine or running it in either direction, as described.

9th, Making each alternate helix, of those formed of the same strip of metal, coil around in a diverse direction from the others, in such manner that when an electric current passing through a line of helices, so formed of the same strip of metal, produces a north polarity in one end of a magnetic bar, placed in any one of said helices, a south polarity will be produced in the same end of a magnetic bar placed in either of the adjoining helices of the same line, the electric current flowing in the same direction through all the helices in the same column, substantially as and for the purpose described.

10th, Such an arrangement of the columns of helices on the opposite sides of the engine that through any two columns, one on the back and the other on the front of the engine, through which the same electro-magnetic chain passes, the electric current shall flow in diverse directions, giving north polarity to the upper end of a magnetic bar in one, while it gives south polarity to the upper end of the magnetic bars in the other, and *vice versa*, all substantially as described and for the purpose set forth.

78,630.—RAILWAY RAIL CHAIR.—William Wickersham, Boston, Mass.

I claim, 1st, In a railway rail chair, the screw cylinders, a a, when constructed to work or operate automatically, substantially for the purpose set forth.

2d, In combination with the screw cylinders, the springs, d d, as described, and for the purpose set forth.

3d, The construction of the screw cylinders, a' a', with the spaces, f, and wedge, g, in combination with the chair, substantially as described and for the purpose set forth.

4th, In combination with the screw cylinders, the metallic strips, 1 1, as described and for the purpose set forth.

78,631.—HERDING AND SECURING CATTLE.—Jesse Wilkinson (assignor to Horace Ballard Wilkinson), Urbana, Ill

I claim the combination of the windlass for stretching the rope, D, the said rope, the post, C, and trusses, S B, resting upon the ground, together with the traversing block and pulley, E, and adjustable stops, G, substantially as and for the purpose set forth.

78,632.—BRICK MACHINE.—C. A. Winn, Lock Haven, Pa.

I claim, 1st, A complete and portable brick machine, composed of the steam boiler, A, cylinder, C, clay mill, D, constructed as described, combined and arranged in one portable apparatus in the manner and for the purpose herein set forth.

2d, The formation of the annular chamber, e, of the clay mill, D, with the elevated chambers, g g, the spiral steam tube, G, as connected with the boiler, and arranged in the annular chamber E, and the stationary perforated steam pipes, H H, passing directly from the boiler through the clay mill, horizontally, all combined in the manner and for the purpose herein set forth and described.

78,633.—FLOOD FENCE.—Valentine Wood, Richmond, Ind.

I claim the fence panel, A, the lower bar, B, of which is pivoted to posts, C, and which is supported in an inclined position by braces, D, when arranged in relation to the embankment, E, to operate substantially as described.

78,634.—BRICK MACHINE.—Charles D. Wrightington, Fair Haven, and Benjamin P. Rider, Chelsea, Mass.

We claim the secondary motion given to the screws by the cam ledge, H, and the arm, K, in addition to the primary motion for feeding down the clay into the forming tube by the gear wheels, for the purpose of smoothing the clay and finishing out the filling of the tube, substantially as described.

Also, in combination with the mold wheel, P, and pressing followers, 9 10 11 12, the rising and falling table, Y, under the molding wheel, and the delivering apparatus, s t u v, when arranged and timed in their motions and periods of rest, to operate together substantially as described.

78,635.—PAVEMENT.—Arcalous Wyckoff, Elmira, N. Y.

I claim, 1st, A pavement, formed of blocks of wood of irregular forms and uniform length, resting upon a plank floor, and having the intermediate spaces filled with a fibrous material and gravel or sand and coal tar, substantially as set forth.

2d, The arrangement and method of forming foundations between the blocks of wooden pavements, by forming a base of saw dust, tan bark, or analogous fibrous material, and placing thereupon gravel or sand, to fill up such spaces, in the manner and for the purpose herein described

78,636.—APPARATUS FOR EXTINGUISHING FIRES.—William Mullally, Boston, Mass.

I claim, 1st, An apparatus for extinguishing fires, composed of the vessel, A, the foraminous shelf, e, or its equivalent, and the escape cock, f, the vessel A, being provided with a filling aperture, and the whole being constructed, adjusted, and operating essentially in manner and for the purpose as herein shown and described.

2d, The employment of the foraminous shelf or its equivalent, as before set forth and explained.

## REISSUES.

2,956.—MACHINE FOR PUNCHING LEATHER.—James M. Bent, Wayland, Mass. Patented October 16, 1866.

I claim, 1st, The combination of a die with a punch, substantially as and for the purposes described.

2d, The punch and die, when made to revolve in combination, substantially as described.

3d, The mechanically revolving punch, substantially as described.

4th, In combination with a cutting punch, a clearing pin, substantially as described.

5th, So constructing the parts so as to cause the die to adapt itself to different or varying thicknesses of leather, substantially as described.

2,957.—MOP HEAD.—Colby Brothers and Company, Waterbury, Vt., assignees, by mesne assignments, of Harvey Murch, Division A. Patented June 14, 1853.

I claim, 1st, The combination of a socketed cross head with a binder, having the two ends thereof united directly to each other, the combination being substantially such as described.

2d, The combination of a socketed cross head with a binder, having the two ends thereof united directly to or with each other, and a single fastening for holding the whole binder directly to the handle itself, in such position as to clamp rags, etc., the combination being substantially as described.

3d, The combination of a socketed cross head with a handle and a binder, having the two ends thereof united to or with the handle itself, the combination being substantially such as described.

4th, The combination of a cross head with a handle and a binder, having the two ends thereof united directly together, and secured in clamping position on the handle proper, so as to sustain or aid in sustaining the cross head, the combination being substantially such as set forth.

2,958.—MOP HEAD.—Colby Brothers and Company, Waterbury, Vt., assignees, by mesne assignments, of Harvey Murch. Division B. Extended seven years. Patented June 14, 1853.

I claim, 1st, The combination, with a cross head and binder of a ratchet fastening, the combination being substantially as described.

2d, The combination of a ratchet fastening, handle, binder, and cross head the combination being substantially such as set forth.

2,959.—EYELETING MACHINE.—William N. Ely, Stratford, Conn., assignee, by mesne assignments, of Luther Hall. Dated May 14, 1867. Division A.

I claim, 1st, A movable head or carrier, in combination with the punch and set, or either of them, constructed, arranged, and operating substantially as described.

2d, A head or carrier, so constructed and operated as to allow the punch and set to be alternately depressed by the same lever, substantially as described.

3d, So constructing the mechanism that the punching table and setting bed shall reciprocate laterally, and alternately occupy the same place, substantially as and for the purposes described.

4th, The reciprocating punching table, in combination with a stationary work supporting table, when constructed, arranged, and operated as described, so as to be moved to and from the punch, and under the material, substantially as set forth.

5th, The striking lever, so constructed and arranged as to cause the set to pick up the eyelet while the punch is making the hole for its reception, substantially as described.

6th, The setting die, so constructed and operating as to pick up the eyelets from the chute, and present them to the place of insertion, substantially as described.

7th, The reciprocating setting bed, constructed, arranged, and operating automatically, substantially as described.

8th, Feeding the material forward by means of the setting bed or holding point, substantially as described.

2,960.—EYELETING MACHINE.—William N. Ely, Stratford, Conn., assignee, by mesne assignments, of Luther Hall. Patented May 14, 1867. Division B.

I claim 1st, A feeding instrument, which engages with the work feeds forward, disengages, retracts, and engages again, in combination with a punch or set, or both, substantially as described.

2d, A presser foot, for holding the work to the table, in combination with a punch, or set, or both, substantially as described.

3d, The spring presser foot, in combination with the feeding mechanism, arranged and operating with an eyeleting mechanism, substantially as described.

4th, An adjustable work feeding mechanism, in combination with the mechanism for punching and eyeleting, substantially as described.

5th, Punching the holes, supplying, inserting, and setting the eyelets, adjustably spacing the distances, holding and feeding forward the work, by means of devices so combined as to effect this object automatically, substantially as described.

2,961.—EYELETING MACHINE.—William N. Ely, Stratford, Conn., assignee, by mesne assignments, of Luther Hall. Patented May 14, 1867. Division C.

I claim, 1st, A hopper for holding the eyelets, in combination with agitating devices, substantially as described, and a chute, provided with an enlarged receptacle or dish at its lower end, substantially as and for the purposes set forth.

2d, A hopper and chute, constructed and arranged substantially as described, so that the eyelets shall be delivered from the hopper, flaring end down, and presented to the set, flaring end up, substantially set forth.

3d, A hopper and chute, arranged substantially as set forth, in combination with a set and work feeding device, substantially as described.

2,962.—EYELETING MACHINE.—William N. Ely, Stratford, Conn., assignee, by mesne assignments, of Luther Hall. Patented May 14, 1867. Division D.

I claim, 1st, The combination of movable carrier, D, with both punch, E, and set, F, or either of them with lever, K, constructed, arranged, and operating substantially as described.

2d, The combination of movable carrier, D, with both punch, E, and set, F, or either of them, lever, K, and cam, L, constructed, arranged, and operating substantially as described.

3d, The combination of movable carrier, D, set, F, and setting bed, S, substantially as described.

4th, The combination of movable carrier, D, punch, E, and sliding plate, Q, substantially as described.

5th, The combination of movable carrier, D, punch, E, set, F, sliding plate Q, and bed, S, substantially as described.

6th, The movable carrier, D, constructed, arranged, and operated, substantially as described.

7th, The combination of levers, V and T, and pin, S, substantially as and for the purposes described.

8th, The combination of plates, Q and L, arranged and operated substantially as described.

9th, The combination of levers, V and T, pin, S, and screw, w, substantially as and for the purpose described.

10th, The combination of lever, T, block, U, lever, V, and eccentric wheel, X, constructed, arranged, and operating substantially as described.

11th, The combination of hopper, B', chute, A', dish, h', and set, F, substantially as described.

12th, The combination of presser foot, N, spring, O, with both punch, E, and set, F, or either of them, and table, A, substantially as described.

2,963.—MACHINE FOR GRINDING PLOW CASTINGS.—Joshua Gibbs, Canton, Ohio. Patented October 4, 1833. Extended seven years.

I claim, 1st, A frame or carriage, beneath a grindstone or polishing wheel, supported at one end by any suitable device, and at the other by the hands of the operator; said frame being capable of a lateral, longitudinal, and oscillating adjustment during the process of grinding, for the purpose of adapting the stone to uneven, irregular, or plane surfaces of articles to be ground or polished, as herein set forth,

2d, In combination with a carriage, supported and operated as above described, beneath a grindstone or polishing wheel, a cord or rope, or its equivalent, for relieving a portion of the weight of the frame in the hands of the operator, as herein set forth.

2,964.—LUBRICATING DEVICE.—Barton H. Jenks, Bridesburg, assignee of Mathew Senior, Frankford, Pa. Patented March 17, 1868.

I claim, 1st, Lubricating a shaft which is required to receive endwise motion also motion about its axis by means substantially as described.

2d, The device for lubricating the feathered shaft, C D, from each side of the feather, through holes in the tubular journal, B, and the hole, f, in the hollow cap, g, as hereing described.

3d, The combination of the lubricating device with a shaft which moves longitudinally independent of its sleeve, and turns with said sleeve, substantially as described.

2,965.—WELL TUBE.—F. A. Mack, Niles, Mich. Patented Sept. 11, 1866.

I claim a well tube in which the openings or incisions, e e, are cut or formed from the inside, so as to leave a diminishing external projection from the inside, in the manner and for the purpose substantially as specified.

2,766.—MACHINE FOR GRINDING SCALE PIVOTS.—Frederick Meyer, Newark, N. J. Patented May 14, 1867.

I claim, 1st, The combination of the two adjustable revolving grinding wheels, G, with the reciprocating carriage, E, provided with head blocks, I, notched rests, p, and clamping device, M, for holding the scale beam, arranged substantially as described, whereby the knife edges or pivots of scale beams are ground to great accuracy of adjustment, as set forth.

2d, The construction and arrangement of the longitudinally sliding carriage C, reciprocating carriage, D, and carriage, E, as herein set forth for the purpose specified; and

3d, Adjusting the scale pivots to be ground upon both sides by means of the set screws or pins, k l, secured to the arm, l, of the sliding carriage, E, and bar, H, upon the frame, A, substantially as herein set forth.

2,767.—MODE OF ATTACHING ORNAMENTAL HEADS TO NAILS. Turner, Seymour, & Judd (assignees of F. J. Seymour), Wolcottville, Conn. Patented June 26, 1866.

We claim a ornamental picture-nail head, made with a sheet metal body or back, having within it a screw thread for the nail, substantially as specified.

## DESIGNS.

3,061.—FLOOR-CLOTH PATTERN.—Hugh Christie, Morrisania, assignor to D. Powers & Sons, Lansingburg, N. Y.

3,062.—KNITTED FABRICS.—J. P. Delahenty, Cohoes, N. Y.

3,063.—BURIAL CASKET.—J. M. Hall, Philadelphia, Pa.

3,064.—B.—CLOCK CASE.—G. B. Owen, Winsted, Conn.

3,065.—STREET-LAMP POST.—R. H. Smith, Pittsburgh, Pa.

3,066.—PERFUME BOTTLE.—Henry Whitney, East Cambridge, Mass.

3,067.—TOILET BOTTLE.—Henry Whitney, East Cambridge, Mass.

3,068.—LAMP FOOT.—Henry Whitney, East Cambridge, Mass.


# PATENTS.

**The First Inquiry that presents** itself to one who has made any improvement or discovery is "Can I obtain a Patent?" A *positive* answer can only be had by presenting a complete application for a Patent to the Commissioner of Patents. An application consists of a Model, Drawings, Petition, Oath, and full Specification. Various official rules and formalities must also be observed. The efforts of the inventor to do all this business himself are generally without success. After a season of great perplexity and delay, he is usually glad to seek the aid of persons experienced in patent business, and have all the work done over again. The best plan is to solicit proper advice at the beginning.

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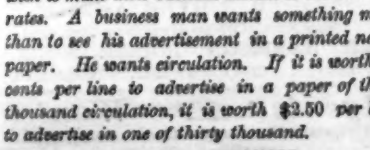

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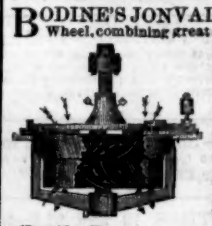

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